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Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **2910**

89 ASTRONOMY **2916**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **2918**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **2920**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **2921**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **2921**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **2922**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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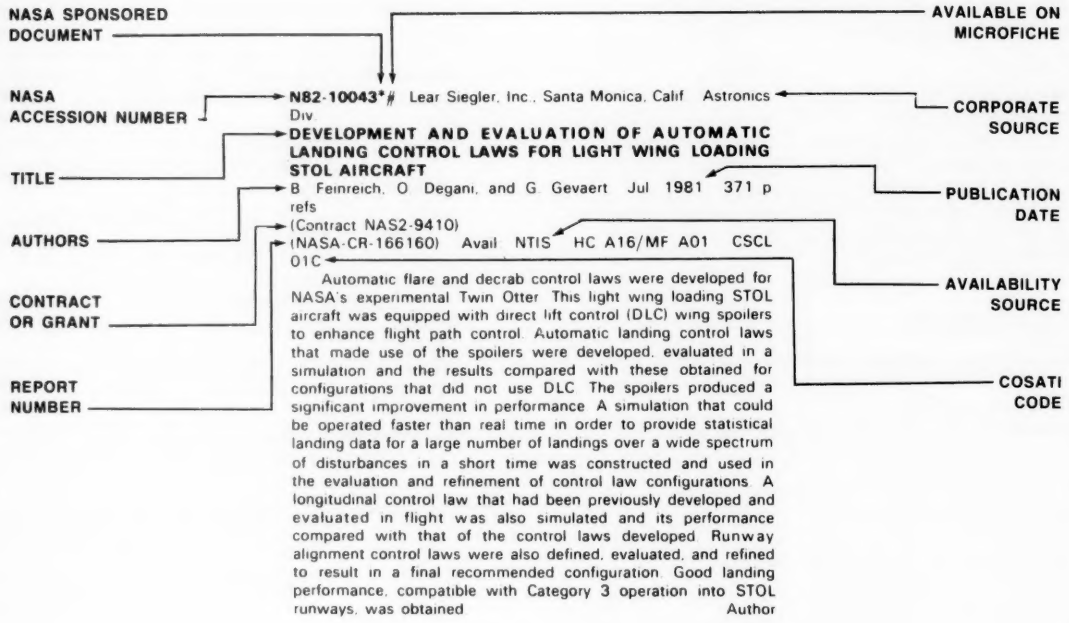
TYPICAL CITATION AND ABSTRACT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N82-10043*# Lear Siegler, Inc., Santa Monica, Calif. Astronics Div.
CORPORATE SOURCE
TITLE
DEVELOPMENT AND EVALUATION OF AUTOMATIC LANDING CONTROL LAWS FOR LIGHT WING LOADING STOL AIRCRAFT
PUBLICATION DATE
AUTHORS
B. Feinreich, O. Degani, and G. Gevaert Jul. 1981 371 p refs
CONTRACT OR GRANT
(Contract NAS2-9410)
AVAILABILITY SOURCE
(NASA-CR-166160) Avail: NTIS HC A16/MF A01 CSCL 01C
REPORT NUMBER
COSATI CODE
Automatic flare and decrab control laws were developed for NASA's experimental Twin Otter. This light wing loading STOL aircraft was equipped with direct lift control (DLC) wing spoilers to enhance flight path control. Automatic landing control laws that made use of the spoilers were developed, evaluated in a simulation and the results compared with these obtained for configurations that did not use DLC. The spoilers produced a significant improvement in performance. A simulation that could be operated faster than real time in order to provide statistical landing data for a large number of landings over a wide spectrum of disturbances in a short time was constructed and used in the evaluation and refinement of control law configurations. A longitudinal control law that had been previously developed and evaluated in flight was also simulated and its performance compared with that of the control laws developed. Runway alignment control laws were also defined, evaluated, and refined to result in a final recommended configuration. Good landing performance, compatible with Category 3 operation into STOL runways, was obtained. Author

VOLUME 20 NUMBER 20/OCTOBER 23, 1982

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N82-29261# Federal Aviation Administration, Washington, D.C. Planning Analysis Div.
FAA AVIATION FORECASTS-FISCAL YEARS 1982-1993
Feb. 1982. 72 p
(AD-A114696; FAA-APO-82-2) Avail: NTIS HC A04/MF A01 CSCL 01/2

This report contains the Fiscal Years 1982 to 1993 Federal Aviation Administration (FAA) forecasts of aviation activity at FAA facilities. These include airports with FAA control towers, air route traffic control centers, and flight service stations. Detailed forecasts were made for the four major users of the national aviation system: air carriers, air taxi/commuters, general aviation and the military. The forecasts have been prepared to meet the budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, by the aviation industry and the general public. GRA

N82-30249*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE DEVELOPMENT VERSION CONTROL AND VISIBILITY SUBSYSTEM
L. R. Hawley *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 113-116 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 05A

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N82-29262*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPUTATION OF HIGH REYNOLDS NUMBER INTERNAL/EXTERNAL FLOWS
Michael C. Cline (Los Alamos National Lab., N. Mex.) and Richard G. Wilmoth Oct. 1981 28 p refs Backup Document for AIAA Synoptic scheduled for publication in the AIAA Journal, Feb. 1983
(NASA-TM-84829; NAS 1.15:84829; Log-J12892) Avail: NTIS HC A03/MF A01 CSCL 01A

A general, user oriented computer program, called VNAF2, developed to calculate high Reynolds number internal/external flows is described. The program solves the two dimensional, time dependent Navier-Stokes equations. Turbulence is modeled with either a mixing length, a one transport equation, or a two transport equation model. Interior grid points are computed using the explicit MacCormack scheme with special procedures to speed up the calculation in the fine grid. All boundary conditions are calculated using a reference plane characteristic scheme with the viscous terms treated as source terms. Several internal, external, and internal/external flow calculations are presented. Author

N82-29263# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
ON EMBEDDED FLOW CHARACTERISTICS OF SHARP EDGED RECTANGULAR WINGS
Erik S. Larson 21 Apr. 1982 19 p refs Backup Document for AIAA Synoptic scheduled for publication in the Journal of Aircraft, Feb. or Mar. 1983
(Log-C4712) Avail: NTIS HC A02/MF A01

The semiempirical, analytic expressions for steady, symmetric flow characteristics on thin rectangular wings at transonic speed are investigated. Semiempirical expressions representing aerodynamic characteristics of sharp edged rectangular wings are reported. The basic coefficients correlated very well with panel method results for Mach number of the free stream < or = 1, the intended domain of applicability. S.L.

N82-29264# National Research Council of Canada, Ottawa (Ontario). National Aeronautical Establishment.
BOUNDARY LAYER DEVELOPMENT ON PERFORATED WALLS IN TRANSONIC WIND TUNNELS
Y. Y. Chan 8 Feb. 1980 52 p refs
(LTR-HA-47) Avail: NTIS HC A04/MF A01

The boundary layer development on the perforated walls of a transonic wind tunnel was studied experimentally. The measurements were made under real model testing conditions to provide a better understanding of the flow, so that a proper boundary condition for wall interference calculations could be formulated. The experimental results show that the boundary layer displacement effect is minimal for the lower wall but for the upper wall the normal velocity induced can be about three times greater than that at the wall. The wall characteristics are strongly modulated by the growth rate of the boundary layer. It also shows that the linear boundary condition used in the wall interference calculations does not adequately reproduce the nonlinear development of the flow at the wall. Author

N82-29265*# Grumman Aerospace Corp., Bethpage, N.Y.
SIMULATION OF A HYDROCARBON FUELED SCRAMJET EXHAUST Final Report
Jarvis Leng Washington NASA Jun. 1982 32 p refs
(Contract NAS1-16401)
(NASA-CR-3583; NAS 1.26:3583; RM-743) Avail: NTIS HC A03/MF A01 CSCL 01A

Exhaust nozzle flow fields for a fully integrated, hydrocarbon burning scramjet were calculated for flight conditions of M (undisturbed free stream) = 4 at 6.1 km altitude and M (undisturbed free stream) = 6 at 30.5 km altitude. Equilibrium flow, frozen flow, and finite rate chemistry effects are considered. All flow fields were calculated by method of characteristics. Finite rate chemistry results were evaluated by a one dimensional code (Bittker) using streamtube area distributions extracted from the

equilibrium flow field, and compared to very slow artificial rate cases for the same streamtube area distribution. Several candidate substitute gas mixtures, designed to simulate the gas dynamics of the real engine exhaust flow, were examined. Two mixtures are found to give excellent simulations of the specified exhaust flow fields when evaluated by the same method of characteristics computer code. T.M.

N82-29266*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

THE STRUCTURE OF A SUBSONIC COMPRESSIBLE RECTANGULAR JET

Y. Hsia, A. Krothapalli, D. Baganoff, and K. Karamcheti Jan. 1982 61 p refs Prepared in cooperation with Stanford Univ., Calif.

(Contract F49620-79-C-0189)

(NASA-TM-84824; NAS 1.15:84824; SU-JIAA-TR-43) Avail: NTIS HC A04/MF A01 CSCL 01A

A subsonic jet of air emanating from a rectangular nozzle of aspect ratio 16.7 was investigated using hot-wire anemometry. Four exit Mach numbers, ranging from 0.18 to 0.8, were studied. Results of the hot-wire measurements show that a compressible subsonic rectangular jet behaves similar to an incompressible jet. It exhibits three distinct regions characterized by the decay of the mean axial velocity along the axis of the jet: a potential core region, a two dimensional type region, and an axisymmetric type region. The effect of increasing the Mach number of the rectangular jet was found to be the extension of the two dimensional type region, and the jet behaves more nearly like a two dimensional jet at higher Mach numbers. This effect is due to the variation in the growth rate of the jet in the plane containing the long dimension of the nozzle only. The Mach number has very little effect on the spreading in the plane containing the short dimension of the nozzle. It is suggested that the turbulence structure of a compressible rectangular jet can be inferred from that of an incompressible jet. J.M.S.

N82-29267*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AERODYNAMICS OF AN AIRFOIL WITH A JET ISSUING FROM ITS SURFACE

D. A. Tavella and K. Karamcheti May 1982 93 p refs

(Contract NCC2-74)

(NASA-TM-84825; NAS 1.15:84825; SU-JIAA-TR-44) Avail: NTIS HC A05/MF A01 CSCL 01A

A simple, two dimensional, incompressible and inviscid model for the problem posed by a two dimensional wing with a jet issuing from its lower surface is considered and a parametric analysis is carried out to observe how the aerodynamic characteristics depend on the different parameters. The mathematical problem constitutes a boundary value problem where the position of part of the boundary is not known a priori. A nonlinear optimization approach was used to solve the problem, and the analysis reveals interesting characteristics that may help to better understand the physics involved in more complex situations in connection with high lift systems. Author

N82-29268*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AIRCRAFT GEOMETRY VERIFICATION WITH ENHANCED COMPUTER GENERATED DISPLAYS

J. V. Cozzolongo Jun. 1982 13 p refs

(NASA-TM-84254; NAS 1.15:84254) Avail: NTIS HC A02/MF A01 CSCL 01A

A method for visual verification of aerodynamic geometries using computer generated, color shaded images is described. The mathematical models representing aircraft geometries are created for use in theoretical aerodynamic analyses and in computer aided manufacturing. The aerodynamic shapes are defined using parametric bi-cubic splined patches. This mathematical representation is then used as input to an algorithm that generates a color shaded image of the geometry. A discussion of the techniques used in the mathematical representation of the geometry and in the rendering of the color shaded display is presented. The results include examples of color shaded displays, which are contrasted with wire frame type displays. The examples also show the use of mapped surface pressures in terms of color shaded images of V/STOL fighter/attack aircraft and advanced turboprop aircraft. Author

N82-29269*# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.

CALCULATION OF THE FLOW FIELD INCLUDING BOUNDARY LAYER EFFECTS FOR SUPERSONIC MIXED COMPRESSION INLETS AT ANGLES OF ATTACK

Joseph Vadyak and Joe D. Hoffman Jul. 1982 406 p refs

(Grant NsG-3311)

(NASA-CR-167941; NAS 1.26:167941) Avail: NTIS HC A18/MF A01 CSCL 01A

The flow field in supersonic mixed compression aircraft inlets at angle of attack is calculated. A zonal modeling technique is employed to obtain the solution which divides the flow field into different computational regions. The computational regions consist of a supersonic core flow, boundary layer flows adjacent to both the forebod, centerbody and cowl contours, and flow in the shock wave boundary layer interaction regions. The zonal modeling analysis is described and some computational results are presented. The governing equations for the supersonic core flow form a hyperbolic system of partial differential equations. The equations for the characteristic surfaces and the compatibility equations applicable along these surfaces are derived. The characteristic surfaces are the stream surfaces, which are surfaces composed of streamlines, and the wave surfaces, which are surfaces tangent to a Mach conoid. The compatibility equations are expressed as directional derivatives along streamlines and bicharacteristics, which are the lines of tangency between a wave surface and a Mach conoid. S.L.

N82-29270*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

VELOCITY GRADIENT METHOD FOR CALCULATING VELOCITIES IN AN AXISYMMETRIC ANNULAR DUCT

Theodore Katsanis Jul. 1982 23 p refs

(NASA-TP-2029; E-1104; NAS 1.60:2029) Avail: NTIS HC A02/MF A01 CSCL 01A

The velocity distribution along an arbitrary line between the inner and outer walls of an annular duct with axisymmetric swirling flow is calculated. The velocity gradient equation is used with an assumed variation of meridional streamline curvature. Upstream flow conditions can vary between the inner and outer walls, and an assumed total pressure distribution can be specified. S.L.

N82-29271*# Boeing Vertol Co., Philadelphia, Pa.

INVESTIGATION OF A ROTOR SYSTEM INCORPORATING A CONSTANT LIFT TIP Final Contractor Report

M. A. McVeigh, H. Rosenstein, K. Bartie, and F. J. McHugh Oct. 1981 326 p refs

(Contract NAS2-10769)

(NASA-CR-166261; NAS 1.26:166261) Avail: NTIS HC A15/MF A01 CSCL 01A

A wind tunnel test of a 16.8 ft. model of a rotor having passively controlled pivotable tips is described. Performance and vibratory hub load data are presented which compare the performance of the rotor with the tips free and fixed. A brief analysis of the experimental findings is included. S.L.

N82-29272# Naval Air Development Center, Warminster, Pa. Sensors and Avionics Technology Directorate.

COMPUTER PROGRAM FOR CALCULATION OF INTEGRAL MEAN SLOPE CORRELATION PARAMETER Final Report

J. J. Franz, S. R. Shapiro, and M. J. Caddy 30 Apr. 1982 24 p refs

(WSL700000)

(AD-A114612; NADC-76386-30) Avail: NTIS HC A02/MF A01 CSCL 20/4

A computer program has been developed which calculates an aircraft integral-mean-slope geometrical parameter from detailed information of aft-fuselage area distribution. The IMS parameter correlates with high subsonic and transonic drag measurements and is utilized as a measure of aircraft performance. Author (GRA)

N82-29273*# Stanford Univ., Calif. Joint Inst. of Aeronautics and Acoustics.

THE STRUCTURE OF A SUBSONIC COMPRESSIBLE

RECTANGULAR JET Interim Report
Y. Hsia, A. Krothapalli, D. Baganoff, and K. Karamcheti Jan. 1982 62 p refs Sponsored in part by NASA-Ames
(Contract F49620-70-C-0189; AF Proj. 2307)
(NASA-CR-169110; NAS 1.26:169110; AD-A114821; SU-JIAA-TR-43; AFOSR-82-0373TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

A subsonic jet of air emanating from a rectangular nozzle of aspect ratio 16.7 has been investigated using hot wire anemometry. The purpose of this investigation is to extend our knowledge of a rectangular jet from incompressible to compressible flow. Results of the hot wire measurements show that a compressible subsonic rectangular jet behaves similar to an incompressible jet. It exhibits three distinct regions characterized by the decay of the mean axial velocity along the axis of the jet. These three regions are a potential core region, a two dimensional type region, and an axisymmetric type region. The effect of increasing the Mach number of the rectangular jet was found to be the extension of the two dimensional jet at higher Mach numbers. GRA

N82-30261# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
WIND TUNNEL STUDIES OF STORE SEPARATION WITH LOAD FACTOR. FREEDROPS AND CAPTIVE TRAJECTORIES
J. Coste and J. Leynaert *In its* La Rech. Aerospatiale, Bi-monthly Bull. no. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 1-9 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A02/MF A01; original report in FRENCH available at ONERA, Paris FF 55

N82-30265# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
SKIN FRICTION LINES
R. Legendre *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 43-44 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N82-29274# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
FLIGHT ATTENDANT INJURIES: 1971-1976
Donell W. Pollard, Earl D. Folk, and Richard F. Chandler Jan. 1982 60 p refs
(AD-A114909; FAA-AM-82-8) Avail: NTIS HC A04/MF A01 CSCL 01/2

Data from 206 reports of 377 flight attendant injuries occurring from 1971 through 1976 are summarized. These data were obtained from the Cabin Safety Data Bank of the Civil Aeromedical Institute, and are based on Federal Aviation Administration and National Transportation Safety Board accident/incident reports. Information relating to the severity and location of the injury is provided when available from original reports. Data relating to the flight condition and location in the aircraft where the injury occurred are provided. Summaries of each reported injury are included in the appendices.
Author (GRA)

N82-29275# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
CRASHWORTHINESS STUDIES: CABIN, SEAT, RESTRAINT, AND INJURY FINDINGS IN SELECTED GENERAL AVIATION ACCIDENTS
William R. Kirkham, S. Marlene Wicks, and Donald Lee Lowrey Mar. 1982 24 p refs
(AD-A114878; FAA-AM-82-7) Avail: NTIS HC A02/MF A01 CSCL 01/2

This report reviews 47 survivable or partly survivable accidents investigated since 1973 by personnel from the Civil Aeromedical Institute. The accidents were reviewed for a number of features of crashworthiness and, in particular, for injuries to occupants in relation to the severity of the impact and the performance of cabin and restraint systems. Opinions were rendered by trained crash injury investigators as to the role or expected role in seats and upper torso restraints in adding to or lessening the injuries. The data support the general concepts that nonoccupiable portions of the aircraft receive greater physical damage than occupiable areas. The greatest damage to the occupiable area is to the forward portion of cockpit/cabin and the occupants have a greater chance of survival if the cockpit/cabin remains reasonably intact. Occupants seated forward in the cockpit/cabin receive greater injuries than those seated more rearward. Further, the findings suggest tha seat placement or seat failure to one degree or another intensified injuries (as compared to more optimum crashworthy seats) to occupants in at least 30 percent of the accidents reviewed. Upper torso restraints, in the few instances used, were beneficial, and had they been used by all occupants, would have significantly reduced the injuries. The report discusses the relation of the occupant to the seat and restraint system and the apparent benefit to be derived from a well-designed impact attenuating seat and, in particular, use of an upper torso restraint. Author (GRA)

N82-29276# Federal Aviation Administration, Atlantic City, N.J.
REDUCTION AND ANALYSIS OF MODE C ALTITUDE DATA COLLECTED AT HIGH ALTITUDES OVER THE CONTINENTAL UNITED STATES Final Report, Sep. 1977 - Apr. 1978
Robert Rigolizzo Mar. 1982 101 p refs
(AD-A114655; DOT/FAA/CT-81/53; DOT/FAA/EM-82/9)
Avail: NTIS HC A06/MF A01 CSCL 01/2

This report describes the reduction and analysis of mode C altitude data collected over the en route centers of Cleveland, Ohio; Memphis, Tennessee; and Albuquerque, New Mexico. The data were gathered under the aegis of the separation standards program primarily for the study of lateral navigation performance over the continental United States at high altitudes. This study provides a procedure for estimating the vertical flight technical error as evidenced from mode C altitude data recorded at the en route centers. It does not account for basic altimeter system error or flight technical error biases and/or fluctuations that are not observable in the ground-derived mode C reported altitude. The data are fitted to six different analytical distributional forms. The effect that data quantization has on the estimation of the parameters of the distributions is examined. Then statistical tests are performed to evaluate the appropriateness of each distributional model in representing the histogram of the mode C deviations. A preliminary analysis is conducted to investigate the association between mode C altitude and aircraft environmental performance characteristics commonly utilized in evaluating separation criteria, as well as identifying aircraft attributes that are of major interest when evaluating vertical flight technical error. Author (GRA)

N82-29277# Clemson Univ., S.C. Dept. of Industrial Management.
MAXIMIZING SOUTH CAROLINA'S AVIATION RESOURCES: IDENTIFYING POTENTIALLY PROFITABLE COMMUTER AIRLINE ROUTES, VOLUME 2
Clinton H. Whitehurst, Jr., Mark A. McKnew, Michael W. Broadway, and Gayle H. Taylor Oct. 1981 168 p refs
(Grant EDA-04-06-03042-40)
(PB82-139353; EDA-81-0132) Avail: NTIS HC A08/MF A01 CSCL 01B

The commuter airline routes within South Carolina were analyzed. It is concluded there are, in fact, a number of potentially profitable commuter airline routes between communities within South Carolina and interstate routes tying some communities in the State to medium and large hub airports. There is however, still work to be done. As communities grow in size and should

air service to the State by trunk carriers decline further, it would be well worth it for a community to reevaluate its potential to support commuter service in terms of the profitability criteria outlined in this study. GRA

N82-29278# National Transportation Safety Board, Washington, D. C. Bureau of Technology.
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA: U'S GENERAL AVIATION CALENDAR YEAR 1979
5 Nov. 1981 213 p
(PB82-136250: NTSB-ARG-81-1) Avail: NTIS HC A10/MF A01 CSCL 01B

Aircraft accidents which occurred in U.S. general aviation operations during the calendar year 1979 are summarized. It includes an analysis of accident data involving an overview, types of accidents, accidental causal factors, kind of flying, and conclusions; a statistical compilation of accident information presented in the form of accident and rate tables, analytic tables, injury tables and cause/factor tables. These statistical data are divided into sections pertaining to all operations, small fixed-wing aircraft, large fixed-wing aircraft, rotorcraft, gliders, and collisions between aircraft. In 1979, there were 4,023 total general aviation accidents, 678 of which were fatal. Included in the total number of accidents are 40 collisions between aircraft. Author

N82-29279# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AIRCRAFT FIRE SAFETY
May 1982 174 p refs Presented at AGARD Lecture Series, Oslo, 7-8 Jun 1982 and London, 10-11 Jun. 1982 and Washington, 15-16 Jun. 1982
(AGARD-LS-123; ISBN-92-835-1424-6) Avail: NTIS HC A09/MF A01

Progress in aerospace science and technology, especially pertaining to aircraft safety was reported. The goals of the international organization are to: strengthen common defense posture, improve international cooperation in research and development, provide scientific and technical advance to NATO in aerospace R&D, increase scientific and technical potential and recommend effective use of R&D capabilities. The following topics are discussed: aircraft fire mishap experience/crash fire scenario quantitation; human response to fire; aviation fuels, future outlook and impact on aircraft fire threat; fuel system protection methods; fireworthiness of transport aircraft interior systems; the development and application of a full scale wide body test article to study the behavior of interior materials during a postcrash fuel fire; aircraft postcrash fire reduction/survivability enhancement from a manufacturer's viewpoint; and aircraft postcrash fire fighting/rescue. For individual titles, see N82-29280 through N82-29287.

N82-29280# Federal Aviation Administration, Washington, D.C. Engineering Analysis Branch.
AIRCRAFT FIRE MISHAP EXPERIENCE/CRASH FIRE SCENARIO QUANTITATION
Thomas G. Horeff *In* AGARD Aircraft Fire Safety May 1982 6 p refs (For primary document see N82-29279 20-03)
Avail: NTIS HC A09/MF A01

Civil and military turbine aircraft accidents were reviewed. It was confirmed that the major postcrash fire hazard was caused by ignition of fuel released from wing separation failured during impact survivable accidents. General scenarios for postcrash fire hazards are described and heat flux levels and cabin airflow rates based on fuselage postcrash fire tests are suggested. Fire fatalities to fire tests are suggested. Fire fatalities to fire scenarios and fire experience data base through 1979 are related. It is concluded that the reduction of postcrash fire gives the greatest potential for improved crashworthiness and increased occupant survivability. E.A.K.

N82-29281# Army Aeromedical Research Lab., Fort Rucker, Ala.
HUMAN RESPONSE TO FIRE
Stanley C. Knapp and Francis S. Knox, III *In* AGARD Aircraft Fire Safety May 1982 19 p (For primary document see N82-29279 20-03)
Avail: NTIS HC A09/MF A01

Human survival in aircraft fire was investigated. Aircraft fires and human survival in thermophysical dimensions and aircraft fire properties, chemical and toxic nature of fibres, the concept of worst credible environment, and survival time dimension derived from ground and airborne fire suppression are discussed. The epidemiology of human fire morbidity and mortality are divided into: (1) no personal protection, no prevention of fire; (2) inadequate protection, no prevention of fire; and (3) prevention of fire and good protection. Assessment techniques to select fabric for protective clothing are examined. Physical and biomedical bases to formulated strategies for the development of aircraft fire prevention and personal protection which leads to increased human survival is constructed. E.A.K.

N82-29282# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero Propulsion Lab.
AVIATION FUELS-FUTURE OUTLOOK AND IMPACT ON AIRCRAFT FIRE THREAT
A. V. Churchill *In* AGARD Aircraft Fire Safety May 1982 17 p refs (For primary document see N82-29279 20-03)
Avail: NTIS HC A09/MF A01

The properties of aviation turbine fuels with respect to aircraft fire safety are described. It is indicated that projections of the availability of petroleum crudes specifications for aviation turbine fuels may have to be modified to use fuels produced from shale oil, heavy oils and coal. Projections of the chemical and physical properties of future aviation fuels produced from these alternative sources are discussed and compared with present fuels. Progress on programs to develop fire safe fuels through the use of antimisting additives is also described. E.A.K.

N82-29283# Royal Aircraft Establishment, Farnborough (England). Engineering Physics Dept.
FUEL SYSTEM PROTECTION METHODS
H. W. G. Wyeth *In* AGARD Aircraft Fire Safety May 1982 16 p refs (For primary document see N82-29279 20-03)
Avail: NTIS HC A09/MF A01

A fuel system protection equipment for military aircraft and helicopters, to reduce fires and explosions which occur under combat conditions was developed. Equipments are available for fitment to civil transport for survivability enhancement. It is recommended that aircraft fire safety and crash resistance in the initial design and appropriate safety precautions taken to minimize the risk of fire and explosion both in flight and on the ground should be considered. It is concluded that fuel containment systems and antimisting fuels can reduce dynamic fuel spillage and improve occupant survivability in postcrash fire. E.A.K.

N82-29284*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIREWORTHINESS OF TRANSPORT AIRCRAFT INTERIOR SYSTEMS
John A. Parker and D. A. Kourtides *In* AGARD Aircraft Fire Safety May 1982 17 p refs (For primary document see N82-29279 20-03)
Avail: NTIS HC A09/MF A01

The fire worthiness of air transport interiors was evaluated. The effect of interior systems on the survival of passengers and crew in an uncontrolled transport aircraft fire is addressed. Modification of aircraft interior subsystem components which provide improvements in aircraft fire safety are examined. Three specific subsystem components, interior panels, seats and windows, offer the most immediate and highest payoff by modifying interior materials of existing aircrafts. It is shown that the new materials modifications reduce the fire hazards because of significant reduction in their characteristic flame spread, heat release, and smoke and toxic gas emissions. E.A.K.

N82-29285# Federal Aviation Administration, Atlantic City, N.J. Fire Safety Branch.
THE DEVELOPMENT AND APPLICATIONS OF A FULL-SCALE WIDE BODY TEST ARTICLE TO STUDY THE BEHAVIOR OF INTERIOR MATERIALS DURING A POST-CRASH FUEL FIRE
Constantine P. Sarkos, Richard G. Hill, and Wayne D. Howell *In* AGARD Aircraft Fire Safety May 1982 21 p refs (For primary document see N82-29279 20-03)
Avail: NTIS HC A09/MF A01

The full scale, wide body test article was developed to study

postcrash cabin fires. Applications of the C-133 article are described as follows: (1) capabilities and instrumentation; (2) derivation of fuel fire test conditions based on physical modeling and fire tests; (3) characterization of cabin fire hazards which result from exposure of wide body interior materials to external fuel fire; and (5) evaluation of effectiveness of urethane seat cushion fire blocking layers and improved cushioning materials. It is shown that cabin hazards and parameters associated with postcrash fire can be realized by use of improved materials. E.A.K.

N82-29286# British Aerospace Aircraft Group, Bristol (England). Fire Precautions Engineering Dept.

AIRCRAFT POST CRASH FIRE REDUCTION/ SURVIVABILITY ENHANCEMENT FROM A MANUFACTURER'S VIEWPOINT

T. Madgwick *In* AGARD Aircraft Fire Safety May 1982 23 p refs (For primary document see N82-29279 20-03)
Avail: NTIS HC A09/MF A01

The importance of achieving a balanced level of overall safety for flight and crash situations are outlined. Research and development in the area of external fire effects and occupant escape is evaluated. The crashworthiness requirements developed for the SST and the means of compliance are outlined. Cabin interior material combustion hazards are discussed. Visibility tests in a smoke filled cabin and the relative importance of toxicity effects in hindering escape are assessed. E.A.K.

N82-29287# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Antriebstechnik.

AIRCRAFT POST-CRASH FIRE FIGHTING/RESCUE

R. Fiala *In* AGARD Aircraft Fire Safety May 1982 27 p refs (For primary document see N82-29279 20-03)
Avail: NTIS HC A09/MF A01

The correlation between specific extinguishing time and the size of the burning fuel area was calculated. The influence of fuel properties, the boiling temperature and viscosity on extinguishing efficiency of foams is described. An extinguishing technique which considers the dependence of extinguishing efficiency on the foam properties is presented. The requirements for foam monitors are shown. The break up of foam jets, produced by foam monitors is discussed. The extinguishing efficiency with the combined application of dry powder halon and foam and the advantages of a combined use when there is only a pool fire are outlined. E.A.K.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N82-29288*# Princeton Univ., N. J. Flight Research Lab.

DEVELOPMENT OF FLYING QUALITIES CRITERIA FOR SINGLE PILOT INSTRUMENT FLIGHT OPERATIONS Interim Report, Sep. 1979 - May 1981

Aharon Bar-Gill, W. Barry Nixon, and George E. Miller Jun. 1982 167 p refs
(Contract NAS1-15764)
(NASA-CR-165932; NAS 1.26:165932; MAE-1528) Avail: NTIS HC A08/MF A01 CSCL 17G

Flying qualities criteria for Single Pilot Instrument Flight Rule (SPIFR) operations were investigated. The ARA aircraft was modified and adapted for SPIFR operations. Aircraft configurations to be flight-tested were chosen and matched on the ARA in-flight simulator, implementing modern control theory algorithms. Mission planning and experimental matrix design were completed. Microprocessor software for the onboard data acquisition system was debugged and flight-tested. Flight-path reconstruction procedure and the associated FORTRAN program were developed. Algorithms associated with the statistical analysis of flight test results and the SPIFR flying qualities criteria deduction are discussed. N.W.

N82-29289# Practical Sciences, Inc., Carlisle, Mass.

GLR ALGORITHMS FOR DETECTING AND ESTIMATING ABRUPT MANEUVERS IN ASMD SCENARIOS USING A DECOMPOSITION OF THE MANEUVER SIGNATURE MATRIX

Harold L. Stalford Jul. 1981 101 p
(Contract N00014-80-C-0775; NR Proj. 041-568)
(AD-A112988; PSI-TR-81-1) Avail: NTIS HC A06/MF A01 CSCL 15/3

Two recursive GLR algorithms for detecting and estimating maneuver states and parameters in the engagement between an anti-ship cruise missile and a ship defense interceptor are presented. A decomposition of the maneuver signature matrix is used to derive the algorithms. The computational and storage requirements are substantially less than those of other GLR algorithms. The decomposition divides the maneuver signature matrix into the product of two matrices. One matrix depends only on the current observation time while the other depends only on the jump time. The product of the latter matrix and the jump magnitude vector provides a jump error state vector which is constant. This constancy facilitates using the GLR approach. The other matrix of the decomposition represents the new maneuver signature matrix for the new constant jump error state vector. The nondependency of the maneuver signature matrix on the jump time avoids storing large matrices and computing large matrix products for each past time observation time.
Author

N82-29290# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

EFFECTS OF APPROACH LIGHTING AND VARIATION IN VISIBLE RUNWAY LENGTH ON PERCEPTION OF APPROACH ANGLE IN SIMULATED NIGHT LANDINGS

Henry W. Mertens and Mark F. Lewis Feb. 1982 21 p refs
(AD-A114742; FAA-AM-82-6) Avail: NTIS HC A02/MF A01 CSCL 01/2

Previous experiments have demonstrated illusions due to variations in both length and width of runways in nighttime 'black hole' approaches. Even though approach lighting is not designed to provide vertical guidance, it is possible that cues from approach lights could interact with cues from runway lighting to reduce illusions due to variation in runway size. Two experiments were conducted to evaluate the effect of approach lighting on perception of approach angle in simulated night approaches. In the first experiment, 40 pilots made simulated visual approaches to a 150- by 6,000-ft runway with and without a 3,000-ft approach light system (ALSF-2). Pilots controlled a moving runway model to produce a constant 'normal' angle of approach over the distance range of 23,000 ft to 8,000 ft from threshold. In the second experiment, 24 pilots made simulated approaches to a 150- by 6,000-ft runway which was either fully visible or which had lights of the upwind half occluded. In addition, a 1,400-ft abbreviated approach light system (SSALS) was used at three intensities. Decreasing the visible length of the runway by occulting lights of the far half increased mean generated approach angles from 2.2 deg to 2.7 deg in agreement with results of a previous experiment involving similar lengths of runways. Neither the presence of equal intensity approach lights nor uncomfortable glare from approach lights 20 times brighter than runway lights had an effect of practical significance on responses. These findings reinforce previous experimental demonstrations of the importance of runway size cues related to varying runway length, and also show that potential size cues provided by approach lights do not prevent illusions due to variations in runway size. GRA

N82-29291# SRI International Corp., Menlo Park, Calif.

TERMINAL INFORMATION DISPLAY SYSTEM BENEFITS AND COSTS Final Report

Waheed Siddiqee, Janet Tornow, and Mina Chan Washington FAA Mar. 1982 79 p refs
(Contract DOT-FA-79-WA-4344)
(AD-A114937; FAA-APO-82-4) Avail: NTIS HC A05/MF A01 CSCL 17/7

Benefits and costs expected to accrue from a terminal information display system (TIDS) are analyzed. TIDS is an electronic data processing system intended to replace (1) present flight data entry and printing equipment and (2) several devices currently used to display meteorological and operational information within towers and terminal radar control facilities. A description of the terminal information display system is presented. Major sources of both quantifiable and nonquantifiable benefits are discussed. It is shown that the installation of TIDS would improve terminal controller productivity by ten to fifteen percent and would result in a substantial reduction in maintenance costs. Information in present value (1981) dollars for the equipment life cycle is presented. Over the twenty year service life of TIDS, the analysis indicates that the benefit/cost ratio is 1.74 and the net present value of savings by installing TIDS at thirty major terminal facilities is about $26 million. GRA

N82-29292# Applied Geophysics, Inc., Salt Lake City, Utah.
GEOPHYSICAL FLIGHT LINE FLYING AND FLIGHT PATH RECOVERY UTILIZING THE LITTON LTN-76 INERTIAL NAVIGATION SYSTEM
A. F. Mitkus, Dwight Cater, Patrick F. Farmer, and S. Parker Gay, Jr. Nov. 1981 177 p refs Prepared for High Life Helicopter, Inc.
(Contract DE-AC13-79GJ-01692)
(DE82-005555; GJBX-363-81) Avail: NTIS HC A09/MF A01

The Litton LTN-76 Inertial Navigation Systems (INS) with Inertial Track guidance system software is geared toward the airborne survey industry. This report is a summary of tests performed with the LTN-76 designed to fly an airborne geophysical survey as well as to recover the subsequent flight path utilizing INS derived coordinates. DOE

N82-29293# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HUMAN FACTORS IN AIR TRAFFIC CONTROL
V. David Hopkin (Royal Air Force Inst. of Aviation Medicine) Apr. 1982 187 p refs
(AGARD-AG-275; ISBN-92-835-1421-1) Avail: NTIS HC A09/MF A01

Human factors are related to air traffic control, air traffic control systems, the physical surroundings, equipment, and operation of the system, and the selection, development, training and evaluation of air traffic controllers. For individual titles, see N82-29294 through N82-29310.

N82-29294# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE AIR TRAFFIC CONTROL SYSTEM
In its Human Factors in Air Traffic Control Apr. 1982 p 3-9
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

Principles and practices of air traffic control are described. The information influencing the air traffic control system and the information available to the controller are summarized and defined. The users of air traffic control, whether commercial, military, or general aviation traffic is considered, are categorized, and their responsibilities discussed. Interactions between air traffic control and the pilot are considered. National and regional variations in the problems and practices of air traffic control are described. J.D.

N82-29295# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HUMAN FACTORS CONTRIBUTIONS TO AIR TRAFFIC CONTROL SYSTEMS
In its Human Factors in Air Traffic Control Apr. 1982 p 10-21
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The role of the human factors specialist in air traffic control systems operations and planning is analyzed. Man-machine interactions; the contribution of human factors engineering to system design, the implementation and testing of air traffic control systems and tasks, and the evolution of air traffic control systems; and the educational role of human factors specialists as applied to air traffic control are considered. J.D.

N82-29296# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
MAN AS A SYSTEM COMPONENT
In its Human Factors in Air Traffic Control Apr. 1982 p 22-30
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The air traffic controller is considered as a component of a man-machine system. Limitations of this approach are considered. The allocation of functions, the effects of automation and computer assistance, the man-machine interface, and human reliability are discussed. J.D.

N82-29297# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HUMAN CAPABILITIES AND LIMITATIONS IN SYSTEMS
In its Human Factors in Air Traffic Control Apr. 1982 p 31-46
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

Human capabilities and limitations which restrict the development of air traffic control systems are discussed. Sensory factors, perception, learning, memory, capacity for attention, information processing, understanding, problem solving, decision making, and motivation are considered. Common mismatches of system requirements with human capabilities are described. J.D.

N82-29298# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
JOBS AND TASKS IN AIR TRAFFIC CONTROL
In its Human Factors in Air Traffic Control Apr. 1982 p 47-52
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

Jobs and tasks are discussed. The required content of job descriptions and their application to allocation of jobs is considered. Task analysis and task synthesis, task grouping, interactions between tasks, and workloads are described. J.D.

N82-29299# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE WORK ENVIRONMENT
In its Human Factors in Air Traffic Control Apr. 1982 p 53-62
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The work environment for all traffic control tasks is considered. Principles of workspace design are discussed. The physical environment, suites and consoles, air traffic control centers and control rooms, and air traffic control towers are described. J.D.

N82-29300# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
DISPLAYS
In its Human Factors in Air Traffic Control Apr. 1982 p 63-78
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

Factors affecting interactions between visual displays and their users are discussed. The physical dimensions of the display, the layout of the display and of information within the display, the information content of the display, visual codings and color codings, the legibility and readability of displays, the relation between displays, and the quality of displayed information are considered. New display technology is summarized. J.D.

N82-29301# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
CONTROLS
In its Human Factors in Air Traffic Control Apr. 1982 p 79-84
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The location, type, sensitivity, and interactions of the controls used by the human to convey information to the air traffic control system are discussed. The relationships between controls and visual displays are considered. J.D.

N82-29302# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
COMMUNICATIONS
In its Human Factors in Air Traffic Control Apr. 1982 p 85-93
(For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The human factor terms of communication in air traffic control are examined. The effects of known specified variables in communications on controller performance or system efficiency were measured. The importance of speech and the use of computers in the man machine systems as a means of dialogue and information transmission is emphasized. The following topics are discussed: transmission of information between air and ground; speech as a medium of communication; qualitative attributes of speech; automated speech recognition and automated speech synthesis; coordination and liaison; language and terminology of air traffic control; air traffic phrasing and message formats; information quantification and redundancy in air traffic control messages. E.A.K.

N82-29303# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE SELECTION OF CONTROLLERS
In its Human Factors in Air Traffic Control Apr. 1982 p 94-100 (For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The process of selection of air traffic controllers is examined. Two fundamental issues are the relationship between selection and training, and attributes unrelated to air traffic control. The issues discussed are: supply and demand; identification of relevant attributes; psychological tests; the role of air traffic control tasks and knowledge; validity and reliability of selection procedures; and adapting selection procedures to changing needs. E.A.K.

N82-29304# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE TRAINING OF CONTROLLERS
In its Human Factors in Air Traffic Control Apr. 1982 p 101-109 (For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The standardization of training of air traffic controllers to produce fully qualified, safe, and efficient controllers by the most cost effective training methods was examined. Topics discussed are: training objectives; content of training courses; the role of simulation in training; assessments of progress during training; reliability and validity of training procedures; training for new tasks; retraining; and automation in training. E.A.K.

N82-29305# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HUMAN FACTORS IMPLICATIONS OF CONDITIONS OF EMPLOYMENT
In its Human Factors in Air Traffic Control Apr. 1982 p 110-118 (For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The managerial direction of air traffic controllers is reviewed. Performance, attitude, management controller relations, and successfully developed collaboration techniques are examined. The following topics are discussed: management of controllers; consultation with controllers; needs of controllers at work; career structure; work rest cycles; occupational health; and retirement. E.A.K.

N82-29306# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
INFLUENCES ON THE INDIVIDUAL CONTROLLER
In its Human Factors in Air Traffic Control Apr. 1982 p 119-125 (For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

Experiences of and influences on individual air traffic controllers are analyzed. Different parameters which interfere with the daily workload are outlined. The following influences that interfere with performance efficiency are considered: experience, age, stress, boredom, personality, attitudes, trust and job satisfaction. E.A.K.

N82-29307# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE MEASUREMENT OF THE AIR TRAFFIC CONTROLLER
In its Human Factors in Air Traffic Control Apr. 1982 p 126-140 (For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The standardization of measurements for air traffic controller performance are discussed. The purpose for measuring the controllers is outlined and factors measured by task performance are presented. Issues related to the measurements are as follows: system performance; task performance; error, delays, omissions and nonconsistencies; physiological and biological indices; modelling and allied techniques; subjective assessments; social factors; qualitative factors; tests and other measures; and interactions between measures. E.A.K.

N82-29308# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HUMAN FACTORS IN AIR TRAFFIC CONTROL RESEARCH AND DEVELOPMENT
In its Human Factors in Air Traffic Control Apr. 1982 p 141-149 (For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

Research and development in human factors in air traffic control is examined. Topics discussed are: contribution of human factors; human factors applications to air traffic control evaluations; real time and fast time simulation; alternative techniques; identification of relevant measures and variables; reliability and validity of evidence; and interpretation and dissemination of findings. E.A.K.

N82-29309# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
ADDITIONAL FUNCTIONS WITHIN THE AIR TRAFFIC CONTROL SYSTEM
In its Human Factors in Air Traffic Control Apr. 1982 p 150-153 (For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

The application of human factors engineering to other job functions existing within the air traffic control system is discussed. Personnel involved in data gathering, maintenance of system integrity, fault finding, supervision, and traffic control assistance are considered. J.D.

N82-29310# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
FUTURE TRENDS AND PROBLEMS
In its Human Factors in Air Traffic Control Apr. 1982 p 154-155 (For primary document see N82-29293 20-04)
Avail: NTIS HC A09/MF A01

Anticipated developments and problems occurring in the application of human factors engineering to air traffic control systems, particularly in the light of technological advances in hardware and software, are summarized. J.D.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N82-29311*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ESTABLISHMENT OF A ROTOR MODEL BASIS
R. E. McFarland Jun. 1982 93 p refs Prepared in cooperation with Army Aviation Research and Development Command, Moffett Field, Calif.
(NASA-TP-2026; A-8605; NAS 1.60:2026; AVRADCOM-TR-81-A-14) Avail: NTIS HC A05/MF A01 CSCL 01C

Radial-dimension computations in the RSRA's blade-element model are modified for both the acquisition of extensive baseline data and for real-time simulation use. The baseline data, which are for the evaluation of model changes, use very small increments and are of high quality. The modifications to the real-time simulation model are for accuracy improvement, especially when a minimal number of blade segments is required for real-time synchronization. An accurate technique for handling tip loss in discrete blade models is developed. The mathematical consistency and convergence properties of summation algorithms for blade forces and moments are examined and generalized integration

coefficients are applied to equal-annuli midpoint spacing. Rotor conditions identified as 'constrained' and 'balanced' are used and the propagation of error is analyzed. Author

N82-29312*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Applied Mechanics.
FLAP-LAG-TORSIONAL DYNAMICS OF EXTENSIONAL AND INEXTENSIONAL ROTOR BLADES IN HOVER AND IN FORWARD FLIGHT Semiannual Progress Report, Jan. - Jun. 1982
Crespo DaSilva Jun. 1982 72 p refs
(Grant NAG2-38)
(NASA-CR-169159; NAS 1.26:169159) Avail: NTIS HC A04/MF A01 CSCL 01C

The reduction of the O(cu epsilon) integro differential equations to ordinary differential equations using a set of orthogonal functions is described. Attention was focused on the hover flight condition. The set of Galerkin integrals that appear in the reduced equations was evaluated by making use of nonrotating beam modes. Although a large amount of computer time was needed to accomplish this task, the Galerkin integrals so evaluated were stored on tape on a permanent basis. Several of the coefficients were also obtained in closed form in order to check the accuracy of the numerical computations. The equilibrium solution to the set of 3n equations obtained was determined as the solution to a minimization problem. S.L.

N82-29313*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE FEASIBILITY OF A HIGH-ALTITUDE AIRCRAFT PLATFORM WITH CONSIDERATION OF TECHNOLOGICAL AND SOCIETAL CONSTRAINTS Thesis - Kansas Univ.
Ernald B. Graves Jun. 1982 250 p refs
(NASA-TM-84508; NAS 1.15:84508) Avail: NTIS HC A15/MF A01 CSCL 01C

The feasibility of remotely piloted aircraft performing year around missions at an altitude of 70,000 feet is determined. Blimp and airplane type vehicles employing solar-voltaic, microwave, or nuclear propulsion systems were considered. A payload weighing 100 pounds and requiring 1000 watts of continuous power was assumed for analysis purposes. Results indicate that a solar powered aircraft requires more solar cell area than is available on conventional aircraft configurations if designed for the short days and high wind speeds associated with the winter season. A conventionally shaped blimp that uses solar power appears feasible if maximum airspeed is limited to about 100 ft/s. No viable airplane configuration that uses solar power and designed to withstand the winter environment was found. Both a conventionally shaped blimp and airplane appear feasible using microwave power. Nuclear powered aircraft of these type are also feasible. Societal attitudes toward the use of solar power in high altitude aircraft appear favorable. The use of microwave power for this purpose is controversial, even though the ground station required would transmit power at levels comparable to existing satellite communications stations. S.L.

N82-29314*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NONLINEAR ZERO-SUM DIFFERENTIAL GAME ANALYSIS BY SINGULAR PERTURBATION METHODS
J. Sinar and N. Farber Jul. 1982 30 p refs
(NASA-TM-84271; A-8998) NAS 1.15:84271 Avail: NTIS HC A03/MF A01 CSCL 01C

A class of nonlinear, zero-sum differential games, exhibiting time-scale separation properties, can be analyzed by singular-perturbation techniques. The merits of such an analysis, leading to an approximate game solution, as well as the 'well-posedness' of the formulation, are discussed. This approach is shown to be attractive for investigating pursuit-evasion problems; the original multidimensional differential game is decomposed to a 'simple pursuit' (free-stream) game and two independent (boundary-layer) optimal-control problems. Using multiple time-scale boundary-layer models results in a pair of uniformly valid zero-order composite feedback strategies. The dependence of suboptimal strategies on relative geometry and own-state measurements is demonstrated by a three dimensional, constant-speed example. For game analysis with realistic vehicle dynamics, the technique of forced singular perturbations and a variable modeling approach is proposed. Accuracy of the analysis is evaluated by comparison with the numerical solution of a time-optimal, variable-speed 'game of two cars' in the horizontal plane. A.R.H.

N82-29315*# Bell Helicopter Co., Fort Worth, Tex.
INVESTIGATION OF CORRELATION BETWEEN FULL-SCALE AND FIFTH-SCALE WIND TUNNEL TESTS OF A BELL HELICOPTER TEXTRON MODEL 222 Final Report
Patrick K. Squires Jun. 1982 401 p refs
(Contract NAS2-10773)
(NASA-CR-166362; NAS 1.26:166362) Avail: NTIS HC A18/MF A01 CSCL 01C

Reasons for lack of correlation between data from a fifth-scale wind tunnel test of the Bell Helicopter Textron Model 222 and a full-scale test of the model 222 prototype in the NASA Ames 40-by 80-foot tunnel were investigated. This investigation centered around a carefully designed fifth-scale wind tunnel test of an accurately contoured model of the Model 222 prototype mounted on a replica of the full-scale mounting system. The improvement in correlation for drag characteristics in pitch and yaw with the fifth-scale model mounted on the replica system is shown. Interference between the model and mounting system was identified as a significant effect and was concluded to be a primary cause of the lack of correlation in the earlier tests. Author

N82-29316*# Massachusetts Inst. of Tech., Cambridge. Flight Transportation Lab.
THE COST OF NOISE REDUCTION FOR DEPARTURE AND ARRIVAL OPERATIONS OF COMMERCIAL TILT ROTOR AIRCRAFT
Henry B. Faulkner and William M. Swan Jun. 1976 118 p refs
(Contract NAS2-7620)
(NASA-CR-137803; NAS 1.26:137803) Avail: NTIS HC A06/MF A01 CSCL 01C

The relationship between direct operating cost (DOC) and noise annoyance due to a departure and an arrival operation was developed for commercial tilt rotor aircraft. This was accomplished by generating a series of tilt rotor aircraft designs to meet various noise goals at minimum DOC. These vehicles ranged across the spectrum of possible noise levels from completely unconstrained to the quietest vehicles that could be designed within the study ground rules. Optimization parameters were varied to find the minimum DOC. This basic variation was then extended to different aircraft sizes and technology time frames. Author

N82-29317*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AUTOMATED OPTIMUM DESIGN OF WING STRUCTURES. DETERMINISTIC AND PROBABILISTIC APPROACHES
S. S. Rao Aug. 1982 47 p refs
(NASA-TM-84475; L-15169; NAS 1.15:84475) Avail: NTIS HC A03/MF A01 CSCL 01C

The automated optimum design of airplane wing structures subjected to multiple behavior constraints is described. The structural mass of the wing is considered the objective function. The maximum stress, wing tip deflection, root angle of attack, and flutter velocity during the pull up maneuver (static load), the natural frequencies of the wing structure, and the stresses induced in the wing structure due to landing and gust loads are suitably constrained. Both deterministic and probabilistic approaches are used for finding the stresses induced in the airplane wing structure due to landing and gust loads. A wing design is represented by a uniform beam with a cross section in the form of a hollow symmetric double wedge. The airfoil thickness and chord length are the design variables, and a graphical procedure is used to find the optimum solutions. A supersonic wing design is represented by finite elements. The thicknesses of the skin and the web and the cross sectional areas of the flanges are the design variables, and nonlinear programming techniques are used to find the optimum solution. S.L.

N82-29318# Aeronautical Research Labs., Melbourne (Australia).
A DISCUSSION OF THE FLYING QUALITY REQUIREMENTS OF A BASIC TRAINING AIRCRAFT

C. A. Martin Mar. 1982 16 p refs
(AD-A114805; ARL/AERO-TM-337) Avail: NTIS HC A02/MF A01 CSCL 01/3

This Memo aims to identify flying qualities of importance in a basic training aircraft and also to suggest interpretations of particular military specifications. The proposition is developed that flying qualities which are considered 'good' for an operational aircraft are not necessarily desirable for a training aircraft. GRA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N82-29319*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HEADS UP DISPLAY Patent Application
H. Douglas Garner and William E. Howell, inventors (to NASA) Filed 28 May 1982 12 p
(NASA-Case-LAR-12630-1; US-Patent-Appl-SN-383384) Avail: NTIS HC A02/MF A01 CSCL 01D

A heads up aircraft display which allows the pilot to view the display without diverting his attention from the scene ahead is disclosed. The display is designed for use on propeller driven aircraft comprised of a radially disposed row of lamps embedded in the rear surface of a propeller. Measurements of flight data are made by conventional means and converted into digital signals. These digital signals are applied to graphic generators which control lamp drivers which in turn control lamps through slip rings. The lamps are lit at the appropriate times during each revolution of the propeller to display the flight data in graphic form to the pilot. The combination of graphic generators and radially disposed lamps embedded in an aircraft propeller enables the pilot to view the display without diverting his attention from the scene ahead. NASA

N82-29320# Systems Control Technology, Inc., West Palm Beach, Fla.
AVIONICS CERTIFICATION REQUIREMENTS AND PROCEDURES: ERROR BUDGETS FOR VOR/DME-RNAV, LORAN-C, OMEGA AND GPS INCLUDING FLIGHT TECHNICAL ERROR Final Report
R. J. Adams Washington FAA Dec. 1981 160 p refs
(Contract DTFA-01-80-4-10581)
(AD-A114271; FAA-RD-81-107) Avail: NTIS HC A08/MF A01 CSCL 01/4

This study assessed the availability and applicability of error budget data for avionics certification requirements. The investigation includes a review of data for both station oriented (VOR/DME-RNAV) navigation systems and wide area (Loran-C, Omega and GPS) navigation systems. The primary thrust of the analysis was to determine the operational capabilities of the various navigation systems currently being certified. A secondary objective was to examine the viability of current certification procedures, techniques and accuracy criteria to any advanced navigation system. To accomplish these objectives, a detailed assessment of error budget data, error combination techniques and functional performance standards was performed. GRA

N82-29321# National Center for Atmospheric Research, Boulder, Colo. Atmospheric Technology Div.
AN EVALUATION OF THE ROSEMOUNT ICE DETECTOR FOR CLOUD WATER CONTENT MEASUREMENTS
E. N. Brown Oct. 1981 19 p refs
(Grant NSF ATM-77-23757)
(PB82-158833; NCAR/TN-183) Avail: NTIS HC A02/MF A01 CSCL 14B

A Rosemount ice detector was installed on a Research Aviation Facility Queen Air for evaluation. It was used during a winter stratus cloud experiment at Muskegon, Michigan (1978) and also during a cumulus cloud experiment (HIPLEX) in 1980 at Big Spring, Texas. Results indicate that the detector is an extremely sensitive instrument with a reasonable dynamic range. The instrument provides a measurement of icing severity and valid computed water content values only for conditions of small water content and/or low temperature. GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N82-29322# Aeronautical Research Labs., Melbourne (Australia).
RESULTS OF T56 ENGINE PERFORMANCE MONITORING TRIAL IN HERCULES AIRCRAFT, FEBRUARY - JULY 1977
D. E. Glenny Apr. 1981 37 p refs
(ARL-MECH-Eng-TECH-MEMO-409; AR-002-277) Avail: NTIS HC A03/MF A01

An engine performance monitoring trial was carried out on the Hercules aircraft. The engine monitoring procedures were developed as an aid to the flight engineer and the maintenance section, so that the performance of the Allison T56 engines were monitored more closely than was specified in operating procedures, thus enabling engine operation and maintenance action to be carried out more effectively. The trial was conducted on Hercules aircraft, and the initial analysis of results was carried out by personnel who are responsible for maintenance of these aircrafts. Operating instructions for aircrew and maintenance personnel, and the results of the trial are presented. Details of the rationale behind the monitoring procedures and overall conclusions on the trial are given. S.L.

N82-29323*# Teledyne CAE, Toledo, Ohio.
COOLED VARIABLE NOZZLE RADIAL TURBINE FOR ROTOR CRAFT APPLICATIONS
C. Rogo Mar. 1981 205 p refs
(Contract NAS3-22005; DA Proj. 1L1-62209-AH-76)
(NASA-CR-165397; NAS 1.26:165397; Rept-1759) Avail: NTIS HC A10/MF A01 CSCL 21E

An advanced, small 2.27 kb/sec (5 lbs/sec), high temperature, variable area radial turbine was studied for a rotor craft application. Variable capacity cycles including single-shaft and free-turbine engine configurations were analyzed to define an optimum engine design configuration. Parametric optimizations were made on cooled and uncooled rotor configurations. A detailed structural and heat transfer analysis was conducted to provide a 4000-hour life HP turbine with material properties of the 1988 time frame. A pivoted vane and a moveable sidewall geometry were analyzed. Cooling and variable geometry penalties were included in the cycle analysis. A variable geometry free-turbine engine configuration with a design 1477 K (2200 F) inlet temperature and a compressor pressure ratio of 16:1 was selected. An uncooled HP radial turbine rotor with a moveable sidewall nozzle showed the highest performance potential for a time weighted duty cycle. Author

N82-29324*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
QCSEE OVER-THE-WING ENGINE ACOUSTIC DATA
Harry E. Bloomer and Irvin J. Loeffler May 1982 28 p refs
(NASA-TM-82708; E-990; NAS 1.15:82708) Avail: NTIS HC A03/MF A01 CSCL 21E

The over the wing (OTW) Quiet, Clean, Short Haul Experimental Engine (QCSEE) was tested at the NASA Lewis Engine Noise Test Facility. A boilerplate (nonflight weight), high throat Mach number, acoustically treated inlet and a D shaped OTW exhaust nozzle with variable position side doors were used in the tests along with wing and flap segments to simulate an installation on a short haul transport aircraft. All of the acoustic test data from 10 configurations are documented in tabular form. Some selected narrowband and 1/3 octave band plots of sound pressure level are presented. Author

N82-29325# Exotech Proprietary Ltd., Monterey, Calif.
MULTISTAGE AXIAL COMPRESSOR PROGRAM ON TIP CLEARANCE EFFECTS Contractor Report, May 1979 - Aug. 1981
I. Moyle Aug. 1981 49 p refs
(Contract N62271-80-M-2504)
(AD-A107445; NPS67-81-01CR) Avail: NTIS HC A03/MF A01 CSCL 21/5

Tip clearance has long been known to be a source of losses in axial compressors with cantilevered blades. The reasons for the losses, however, are not well understood and current practice in engine design still requires extensive effort to maintain constant minimal operating clearances over a wide range of conditions. The emphasis on clearance control may be appreciated by the typical observation that a ten percent change in peak static pressure rise in a compressor stage may occur for a fifty percent change in clearance. Clearances are typically in the one to five percent of major passage dimension range, and thus a small change in passage dimensions represents a large change in clearance. It is clear that, in general, it would be desirable that blading performance be less sensitive to changes in clearance. Less sensitivity would allow a general relaxation of the mechanical tolerances on a compressor assembly and provide more consistent transient performance. The aerodynamics of achieving such a situation are a challenge as the underlying requirement is improved performance at larger clearances. Work toward understanding the basic mechanisms of tip clearance effects with an emphasis on designing for clearance has been commenced at the Naval Postgraduate School Turbopropulsion Laboratory (NPS/TPL). This report summarizes the preliminary work on the Multistage Compressor (MSC) facility at the Laboratory. GRA

N82-29326# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
WATER INGESTION INTO AXIAL FLOW COMPRESSORS. PART 3: EXPERIMENTAL RESULTS AND DISCUSSION Final Report, 15 Dec. 1977 - 30 Jun. 1981
T. Tsuchiya, S. N. B. Murthy, C. M. Ehresman, and D. Richards Wright-Patterson AFB, Ohio AFWAL Oct. 1981 268 p refs
(Contract F33615-78-C-2401; AF Proj. 3066)
(AD-A114830; AFWAL-TR-80-2090-Pt-3) Avail: NTIS HC A13/MF A01 CSCL 21/5

The subject of air-water mixture flow in axial compressors of jet engines is of practical interest in two contexts of water ingestion: during take-off from rough runways with puddles of water and during flight through rain storms. The change in the compressor performance in turn produces changes in the performance of other components and of the engine as a whole. During the current investigation, (1) an analysis of the effects of water ingestion into a compressor has been carried out leading to the development of a predictive code, the PURDU-WICSTK program and (2) a series of tests have been carried out on a small test compressor with mixtures of gases (containing methane gas to simulate steam) and with air-water droplet mixtures. The experimental results have been compared with predictions. It is concluded that the basic effects of water ingestion into compressors arise through (1) blockage, (2) distortion and (3) heat and mass transfer processes, the changes in blade aerodynamic performance being relatively small. In the case of a compressor of small mass flow and pressure ratio and high operating speed, increased quantities of water ingestion give rise to large quantities of water in the tip region. GRA

N82-29327# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
EFFECT OF WATER ON AXIAL FLOW COMPRESSORS. PART 2: COMPUTATIONAL PROGRAM Final Report, 15 Dec. 1977 - 30 Sep. 1980
T. Tsuchiya and S. N. B. Murthy Wright-Patterson AFB, Ohio AFWAL Jun. 1981 425 p refs
(Contract F33615-78-C-2401; AF Proj. 3066)
(AD-A114831; AFWAL-TR-80-2090-Pt-2) Avail: NTIS HC A18/MF A01 CSCL 21/5

An analysis of the performance of an axial flow compressor operating with mixtures of gases and air-water droplet mixtures was performed. In the case of mixtures of gases, account was taken of the changes in molecular weight and ratio of specific heats. In the case of two phase flow, the major processes of interest are: (1) droplet blade interaction; (2) droplet heating; (3) droplet centrifuging; and (4) droplet break up. The PURDU-WICSTK program developed for the prediction of compressor performance was utilized to obtain the performance of a test compressor. A three dimensional stream line computer code, the UD-0300, was also modified and exercised in the case of compressor operation with mixtures of gases. Water ingestion into the compressor of an aircraft gas turbine engine affects the performance of the engine, and a preliminary analysis of the nature of the effects was also conducted. M.G.

N82-29328# Iowa State Univ. of Science and Technology, Ames. Turbomachinery Components Research Lab.
AERODYNAMICS OF ADVANCED AXIAL-FLOW TURBOMACHINERY Annual Report, 1 Oct. 1980 - 30 Sep. 1981
George K. Serovy, Patrick Kavanagh, and Theodore H. Okiishi Dec. 1981 82 p refs
(Grant AF-AFOSR-0004-80; AF Proj. 2307)
(AD-A114911; ISU-ERI-AMES-82108; TCRL-22; AFOSR-82-0201TR) Avail: NTIS HC A05/MF A01 CSCL 21/5

A multi-task research program on the aerodynamics of advanced axial-flow turbomachinery is continuing at Iowa State University. Program components are intended to result in direct contributions to the improvement of axial-flow fan, compressor, and turbine design procedures. A detailed experimental investigation of intrapassage flow in a large-scale, curved, rectangular cross section channel representative of turbomachinery passages is in progress. Author (GRA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N82-29329*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AGRICULTURAL AIRPLANE MISSION TIME STRUCTURE CHARACTERISTICS
Joseph W. Jewel, Jr. Jul. 1982 44 p refs
(NASA-TM-84470; L-15125; NAS 1.15:84470) Avail: NTIS HC A03/MF A01 CSCL 01C

The time structure characteristics of agricultural airplane missions were studied by using records from NASA VGH flight recorders. Flight times varied from less than 3 minutes to more than 10? minutes. There was a significant reduction in turning time between spreading runs as pilot experience in the airplane type increased. Spreading runs accounted for only 25 to 29 percent of the flight time of an agricultural airplane. Lowering the longitudinal stick force appeared to reduce both the turning time between spreading runs and pilot fatigue at the end of a working day. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

N82-29330* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
METHOD FOR REFURBISHING AND PROCESSING PARACHUTES Patent
Russell T. Crowell, inventor (to NASA) Issued 2 Feb. 1982 7 p Filed 30 May 1980 Supersedes N81-14967 (19 - 06, p 0706) Division of US Patent Appl. SN-862878, filed 12 Dec. 1977, US Patent-4,244,810
(NASA-Case-KSC-11042-1; US-Patent-4,313,291;

US-Patent-4,244,810; US-Patent-Appl-SN-154663; US-Patent-Appl-SN-862878; US-Patent-Class-53-429; US-Patent-Class-8-150) Avail: US Patent and Trademark Office CSCL 14B

A system and method for refurbishing and processing parachutes is discussed including an overhead monorail conveyor system on which the parachute is suspended for horizontal conveyance. The parachute is first suspended in partially open tented configuration wherein open inspection of the canopy is permitted to remove debris and inspect all areas. Following inspection, the parachute is transported by the monorail conveyor to a washing and drying station with the parachute canopy mounted on the conveyor ina systematic arrangement which permits water and air to pass through the ribbonlike material of the canopy. Following drying of the parachute, the parachute is conveyed into an interior space where it is finally inspected and removed from the monorail conveyor and laid upon a table for folding. Official Gazette of the U.S. Patent and Trademark Office

N82-29331*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
INFLIGHT IFR PROCEDURES SIMULATOR Patent Application
Lloyd C. Parker, inventor (to NASA) Filed 11 Jun. 1982 22 p (NASA-Case-KSC-11218-1; US-Patent-Appl-SN-387649) Avail: NTIS HC A02/MF A01 CSCL 14B

An in-flight trainer designed to train students in a conventional aircraft is disclosed. The trainer generates simulated signals and commands to conventional instruments provided in the aircraft that correspond to the normal signals a pilot receives during instrument flight rule (IFR) flights and landing and departure procedures. Results of studies conducted using apparatus which demonstrated the concept indicate that the concept is feasible. Also, students trained using only the In-flight IFR Simulator were more proficient in skills development than those trained using table-top simulators and in aircraft in the conventional manner. J.M.S.

N82-29332# Seville Research Corp., Pensacola, Fla.
OPERATIONAL TEST AND EVALUATION HANDBOOK FOR AIRCRAFT TRAINING DEVICES. VOLUME 1: PLANNING AND MANAGEMENT Final Report
Thomas H. Gray, Stephen R. Osborne, Roik I. Hockenberger, and James P. Smith Williams AFB, Ariz. Air Force Human Resources Lab. Feb. 1982 72 p refs
(Contract F33615-78-C-0063; AF Proj. 1123)
(AD-A112498; AFHRL-TR-81-44-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 05/9

The handbook, comprised of three volumes, is intended to provide guidelines and procedures appropriate for Air Force Operational Test and Evaluation (OT/E) personnel to use in planning, conducting, and reporting the results of simulator assessment efforts. Although of value of all test personnel, it is primarily for the typical novice test manager/director-a person who has subject matter expertise (e.g., a qualified pilot or operator), but who may have little or no previous OT/E experience. The handbook provides detailed coverage on OT/E planning and management, with special emphasis on measuring device operational effectiveness and suitability. In accord with its objectives, the handbook was prepared to serve as a supplement to Air Force Manual 55-43, 'Management of Operational Test and Evaluation', by providing those specific additional evaluation concepts and techniques necessary for aircrew training device (ATD) test and evaluation. Volume 1 is concerned, first with describing both general and specific ATD OT/E planning and management considerations and links those events which occur early in the ATD acquisition process to later ATD OT/E planning and management activities. It defines the various evaluation concepts germane to understanding ATD OT/E, and describes the two major ATD OT/E activities--Initial/Qualification OT/E and Follow-on OT/E; matters of ATD value and worth to the Air Force. The acquisition and life cycle costs associated with modern ATDs make such concerns important. GRA

N82-29333# Calspan Field Services, Inc., Arnold Air Force Station, Tenn.
THE USE OF A MULTI-DEGREE-OF-FREEDOM DUAL BALANCE SYSTEM TO MEASURE CROSS AND CROSS-COUPLING DERIVATIVES Final Report, 1 Oct. - 1 Nov. 1981
D. R. Haberman AEDC Apr. 1982 92 p refs Sponsored by Air Force
(AD-A114813; AEDC-TR-81-34) Avail: NTIS HC A05/MF A01 CSCL 12/1

The equations of motion are derived for two existing dual balance systems used at the Arnold Engineering Development Center (AEDC) to obtain measurements of aerodynamic cross and cross-coupling derivatives. The complete equations of motion presented include the effects of sting motion. Each system incorporates a dynamic cross flexure balance and a five-component static balance. The primary deflection modes of the balances were confirmed using a holographic interferometry measurement technique. Both laboratory and wind tunnel data are presented to illustrate dynamic effects. Author (GRA)

N82-29334# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.
WINDTUNNEL CAPABILITY RELATED TO TEST SECTIONS, CRYOGENICS, AND COMPUTER-WINDTUNNEL INTEGRATION
Apr. 1982 64 p refs
(AGARD-AR-174; ISBN-92-835-1420-3) Avail: NTIS HC A04/MF A01

The roles of computational fluid dynamics and wind tunnels, and their growing interdependence are considered. Transonic test sections, cryogenic testing technology, and integration of computer and wind tunnel testing are discussed. S.L.

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N82-29335*# National Aeronautics and Space Administration, Washington, D. C.
APPROXIMATE ANALYSIS OF THERMAL CONVECTION IN A CRYSTAL-GROWTH CELL FOR SPACELAB 3
Robert F. Dressler Jun. 1982 11 p refs
(NASA-TP-2016; EN-1; NAS 1.60:2016) Avail: NTIS HC A02/MF A01 CSCL 20B

The transient and steady thermal convection in microgravity is described. The approach is applicable to many three dimensional flows in containers of various shapes with various thermal gradients imposed. The method employs known analytical solutions to two dimensional thermal flows in simpler geometries, and does not require recourse to numerical calculations by computer. S.L.

N82-29336*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DIGEST OF CELESTIAL X-RAY MISSIONS AND EXPERIMENTS
Maureen C. Locke Jan. 1982 66 p refs
(NASA-TM-84767; NAS 1.15:84767) Avail: NTIS HC A04/MF A01 CSCL 22A

Information on instruments, the platforms that carried them, and the data they gathered is presented. Instrument selection was confined to detectors operating in the 0.20 to 300 keV range. Included are brief descriptions of the spacecraft, experiment packages and missions. Cross-referenced indexes are provided for types of instruments, energy ranges, time spans covered, positional catalogs and observational catalogs. Data sets from these experiments (NSSDC) are described. Author

N82-29337*# General Dynamics/Convair, San Diego, Calif.
SPACE CONSTRUCTION EXPERIMENT DEFINITION STUDY (SCEDS), PART 2. VOLUME 1: EXECUTIVE SUMMARY Final Report
26 Apr. 1982 32 p refs 2 Vol.
(Contract NAS9-16303)
(NASA-CR-167635; NAS 1.26:167635; GDC-ASP-82-003-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 22A

A baseline Space Construction Experiment (SCE) concept is defined. Five characteristics were incorporated: (1) large space system (LSS) element test, (2) shuttle mission payload of opportunity, (3) attachment to Orbiter with jettison capability, (4) Orbiter flight control capabilities, and (5) LSS construction and assembly operations. N.W.

N82-29338*# General Dynamics/Convair, San Diego, Calif.
SPACE CONSTRUCTION EXPERIMENT DEFINITION STUDY (SCEDS), PART 2. VOLUME 2: STUDY RESULTS Final Report
26 Apr. 1982 148 p refs 2 Vol.
(Contract NAS9-16303)
(NASA-CR-167632; NAS 1.26:167632; GDC-ASP-82-004-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 22A

The Space Construction Experiment (SCE) was defined for integration into the Space Shuttle. This included development of flight assignment data, revision and update of preliminary mission timelines and test plans, analysis of flight safety issues, and definition of ground operations scenarios. New requirements for the flight experiment and changes for a large space antenna feed mask test article were incorporated. The program plan and cost estimates were updated. Revised SCE structural dynamics characteristics were provided for simulation and analysis of experimental tests to define and verify control limits and interactions effects between the SCE and the Orbiter digital automatic pilot. N.W.

N82-29339*# RCA Labs., Princeton, N. J. Microwave Technology Center.
ADVANCED MULTIPURPOSE RENDEZVOUS TRACKING SYSTEM STUDY Final Report, 11 Nov. 1980 - 1 Dec. 1981
Richard J. Laurie and Fred Sterzer 1 Jun. 1982 161 p refs
(Contract NAS9-16252)
(NASA-CR-167708; NAS 1.26:167708; RCA-PRRL-82-CR-1) Avail: NTIS HC A08/MF A01 CSCL 22A

Rendezvous and docking (R&D) sensors needed to support Earth orbital operations of vehicles were investigated to determine the form they should take. An R&D sensor must enable an interceptor vehicle to determine both the relative position and the relative attitude of a target vehicle. Relative position determination is fairly straightforward and places few constraints on the sensor. Relative attitude determination, however, is more difficult. The attitude is calculated based on relative position measurements of several reflectors placed in a known arrangement on the target vehicle. The constraints imposed on the sensor by the attitude determination method are severe. Narrow beamwidth, wide field of view (fov), high range accuracy, and fast random scan capability are all required to determine attitude by this method. A consideration of these constraints as well as others imposed by expected operating conditions and the available technology led to the conclusion that the sensor should be a CW optical radar employing a semiconductor laser transmitter and an image dissector receiver. S.L.

N82-29340# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE PROCESSING AND DATA COMMUNICATION RESOURCES FOR THE BRAZILIAN COMPLETE SPACE MISSIONS
Eduardo Whitaker Bergamini Mar. 1982 22 p Presented at the International Workshop on Space Data Systems (InWSDS), Washington, D.C., 19-21 Jan. 1982
(INPE-2345-PRE/089) Avail: NTIS HC A02/MF A01

The functional segments that constitute the processing and data communication resources planned for the Brazilian complete space mission are presented. These segments are characterized by eight functional parts: (1) space control data network system - REDACE System; (2) ground station supervision; (3) payload ground data acquisition and routing; (4) distributed processing in the Earth stations; (5) missions control center; (6) mission operations center; (7) mission center; and (8) on board data handling. The development of these resources are significantly based on the application of distributed processing to local systems and networks. S.L.

N82-29341# Army Russian Inst., APO New York 09053.
THE SCENT OF THE FUTURE: MANNED SPACE TRAVEL AND THE SOVIET UNION
Barry Stephen Field Jun. 1981 118 p
(AD-A114698; USARI-0299) Avail: NTIS HC A06/MF A01 CSCL 22/1

In the late 19th Century a school teacher in Kaluga, Russia, by the name of Konstantin Tsiolkovskiy began to lay down the theoretical basis for modern rocketry. In the latter half of the 20th Century the dream was transformed from science fiction into reality when the USSR launched Sputnik-1 on 4 October 1957. Since that unsophisticated sphere began sending its famous beeping from overhead, the Soviet Union has maintained an active space program. What are the aims of that program? What do those aims portend? How does the Soviet program compare with others? What are its future directions likely to be? This paper will investigate these questions, particularly as they apply to manned space flight and the cosmonaut program. The history of the Kremlin's space effort will be discussed, announced and deduced goals of the program will be examined, and Moscow's efforts will be compared with the programs of other space powers. GRA

N82-30270# Joint Publications Research Service, Arlington, Va.
CHRONOLOGY OF 'SALYUT-7' FLIGHT
In its USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 2-6 Transl. into ENGLISH from The Soviet News Agency TASS (For primary document see N82-30269 20-99)
Avail: Issuing Activity

N82-30274# Joint Publications Research Service, Arlington, Va.
PRESS CONFERENCE ON ACCOMPLISHMENTS OF 'VENERA-13' AND 'VENERA-14'
In its USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 18-21 Transl. into ENGLISH from Izv. (USSR), 14 Mar. 1982 p 2 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

N82-30281# Joint Publications Research Service, Arlington, Va.
LIST OF RECENT SOVIET SPACE LAUNCHES
In its USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 103-105 Transl. into ENGLISH from TASS (For primary document see N82-30269 20-99)
Avail: Issuing Activity

N82-30188# Istituto di Ricerca e Tecnologia per lo Studio del Plasma Nello Spazio, Frascati (Italy).
THE INTENDED SCIENTIFIC 'JSES OF THE HIPPARCOS SATELLITE BY THE INSTITUTE FOR SPACE ASTROPHYSICS, FRASCATI, ITALY
V. Castellani *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 201-202 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N82-29342*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
STARPROBE: SCIENTIFIC RATIONALE Report of the Ad Hoc Working Groups
J. H. Underwood, ed. and J. E. Randolph, ed. 15 Jun. 1982 118 p refs
(Contract NAS7-100)
(NASA-CR-169144; JPL-Pub-82-49; NAS 1.26:169144) Avail: NTIS HC A06/MF A01 CSCL 12B

The scientific rationale and instrumentation problems in the areas of solar internal dynamics and relativity, solar plasma and particle dynamics, and solar atmosphere structure were studied.

Current STARPROBE mission and system design concepts are summarized. N.W.

N82-29343# Sandia Labs., Albuquerque, N. Mex. Aerodynamic Simulation Div.
USER'S MANUAL FOR THE AMEER FLIGHT PATH-TRAJECTORY SIMULATION CODE
Eugene J. Meyer Oct. 1981 187 p refs
(Contract DE0AC04-76DP-00789)
(DE82-007004; SAND-80-2056) Avail: NTIS HC A09/MF A01

A guide to the use of the AMEER (Aero-Mechanical Equations Evaluation Routines) flight path-trajectory simulation code is presented. The input data requirements, computed output data available, code control features, and code flow logic are described for a rigid-body six-degree-of-freedom or point mass simulation. DOE

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N82-29344*# Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.
FILTER FAILURE DETECTION FOR SYSTEMS WITH LARGE SPACE STRUCTURE DYNAMICS M.S. Thesis
Craig R. Carignan Jun. 1982 107 p refs
(Grant NAG1-126)
(NASA-CR-169146; NAS 1.26:169146; SSL-1-82) Avail: NTIS HC A06/MF A01 CSCL 22B

A failure detection filter is applied to the detection of actuator and sensor failures on a free-free beam. Computer simulation tests are used to verify the filter design and study the effect of unmodeled modes on filter performance. In actuator tests, the failure signal to spillover noise ratio was found to be greatest when the filter bandwidth was 5 rad/sec beyond the input frequency. Observation spillover, however, was found to vary widely in tests run under similar conditions (same input frequency and filter poles) but with different detector gains. In sensor tests, the maximum signal-to-noise ratio for varying filter bandwidth depended upon the initial conditions placed on the unmodeled modes; the performance was good even for initial amplitudes on the first unmodeled mode 7.5% of that on the last modeled mode. Author

N82-29345*# Battelle Columbus Labs., Ohio.
PRELIMINARY FEASIBILITY ASSESSMENT FOR EARTH-TO-SPACE ELECTROMAGNETIC (RAILGUN) LAUNCHERS Final Technical Report, May 1981 - Jun. 1982
Eric E. Rice, L. A. Miller, and R. W. Earhart 30 Jun. 1982 403 p refs
(Contract NAS3-22882)
(NASA-CR-167686; NAS 1.26:167886) Avail: NTIS HC A18/MF A01 CSCL 14B

An Earth to space electromagnetic (railgun) launcher (ESRL) for launching material into space was studied. Potential ESRL applications were identified and initially assessed to formulate preliminary system requirements. The potential applications included nuclear waste disposal in space, Earth orbital applications, deep space probe launchers, atmospheric research, and boost of chemical rockets. The ESRL system concept consisted of two separate railgun launcher tubes (one at 20 deg from the horizontal for Earth orbital missions, the other vertical for solar system escape disposal missions) powered by a common power plant. Each 2040 m launcher tube is surrounded by 10,200 homopolar generator/inductor units to transmit the power to the walls. Projectile masses are 6500 kg for Earth orbital missions and 2055 kg for nuclear waste disposal missions. For the Earth orbital missions, the projectile requires a propulsion system, leaving an estimated payload mass of 650 kg. For the nuclear waste disposal in space mission, the high level waste mass was estimated at 250 kg. This preliminary assessment included technical, environmental, and economic analyses. S.L.

N82-30240*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NETWORKS CONSOLIDATION PROGRAM
M. L. Yeater, D. T. Herman, and E. B. Luers (Bendix Field Engineering Corp.) *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 10-13 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 14B

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N82-29346# National Oceanic and Atmospheric Administration, Washington, D. C. National Earth Satellite Service.
SATELLITE ACTIVITIES OF NOAA, 1981
May 1982 27 p refs
Avail: NTIS HC A03/MF A01

Space systems are reviewed, including polar orbiting, geostationary, and land satellites. Satellite data distribution and support services are summarized. Satellite data uses are reviewed, including winds and temperatures, global radiation, environmental warning, oceanography, hydrology, agriculture, fisheries, international activities, training, and geodesy and geodynamics. Warnings and forecasts, magnetospheric physics, aeronautical charting, and radar techniques are also reviewed. N.W.

N82-29347# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PRELAUNCH ESTIMATES OF NEAR EARTH SATELLITE LIFETIMES USING QUASI-DYNAMIC ATMOSPHERE MODELS - APPLICATION TO A PROPOSED BRAZILIAN SATELLITE
Nellore S. Venkataraman and Kondapalli Rama Rao Feb. 1982 22 p refs Submitted for publication
(INPE-2325-PRE/080) Avail: NTIS HC A02/MF A01

A rapid prelaunch estimate of near Earth satellite lifetimes using the small perturbation theory is calculated. A quasi-dynamic atmospheric model is used employing a different exospheric temperature every three months. The drag coefficient is calculated using kinetic theory. S.L.

N82-29348# Maxfield Associates Ltd., Falls Church, Va.
REPORT OF THE ANALYSIS OF THE JOINT MEDIUM RANGE AIR TO SURFACE MISSILE PROGRAM Final Technical Report
23 Jan. 1980 153 p
(Contract N00019-79-C-0526)
(AD-A114372) Avail: NTIS HC A08/MF A01 CSCL 16/4

The objective of this effort completed between July, 1979 and January, 1980 was to investigate technical alternatives and make recommendations concerning management approaches to accomplish the project goals. The purpose of this report is to formalize those recommendations and to identify future courses of action alternatives. The basic concepts incorporated in a supersonic stand-off, air-to-surface missile have existed in Navy advance planning for many years. Navy action on this concept was formalized in 1967 with the decision to initiate a funded technology program to produce a system technology prototype of an advance tactical stand-off missile. Parallel development of propulsion, guidance, and other subsystem technologies conducted by the Air Force, industry, and other countries have also contributed to the current technology base. In May 1978, the Chief of Naval Operations established a requirement for a survivable medium range air-to-surface missile with the issuance of operational requirement W-0650-TW, 'Medium Range Air-to-Surface Missile'. The requirements delineate the need for an offensive air-to-surface missile that can penetrate and survive

against defenses expected to be encountered in the 80's and 90's. GRA

N82-30273# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF DESIGN FOR 'VENERA' LANDERS
V. Zubkov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 16-17 Transl. into ENGLISH from Sots. Industr. (USSR), 12 Mar. 1982 p 4 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

N82-30279# Joint Publications Research Service, Arlington, Va.
SOVIET COMMUNICATIONS SATELLITES
Pavel Artemyevich Agadzhanov, Amos Aleksandrovich Bolshoy, and Viktor Ivanovich Galkin *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 58-88 Transl. into ENGLISH from Nov. Zhizni, Nauke, Tekh.: Ser. Kosmonavt., Astron. (USSR), no. 12, Dec. 1981 p 3-6, 18-56 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

N82-29349*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STS-3 MAIN PARACHUTE FAILURE
Roy Runkle and Keith Henson Jun. 1982 28 p refs
(NASA-TM-82490; NAS 1.15:82490) Avail: NTIS HC A03/MF A01 CSCL 22A

A failure analysis of the parachute on the Space Transportation System 3 flight's solid rocket booster's is presented. During the reentry phase of the two Solid Rocket Boosters (SRBs), one 115 ft diameter main parachute failed on the right hand SRB (A12). This parachute failure caused the SRB to impact the Ocean at 110 ft/sec in lieu of the expected 3 parachute impact velocity of 88 ft/sec. This higher impact velocity relates directly to more SRB aft skirt and more motor case damage. The cause of the parachute failure, the potential risks of losing an SRB as a result of this failure, and recommendations to ensure that the probability of chute failures of this type in the future will be low are discussed. R.J.F.

N82-29350# Committee on Science and Technology (U. S. House).
FLIGHT OF STS-3 WITH ASTRONAUTS COLONEL JACK ROBERT LOUSMA AND COLONEL CHARLES G. FULLERTON
Washington GPO 1982 22 p Hearing before the Comm. on Sci. and Technol., 97th Congr., 2nd Sess., no. 82, 21 Apr. 1982
(GPO-94-035) Avail: Committee on Science Technology

Testimony on the STS-3 mission is presented. N.W.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

N82-30243*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PERFORMANCE DEGRADATION OF THE BLOCK IV TELEMETRY SYSTEM DUE TO THE PRESENCE OF A CW INTERFERENCE
M. K. Sue *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 36-48 refs (For primary document see N82-30237 20-39)
Avail: NTIS HC A10/MF A01 CSCL 09F

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N82-29351*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGNING DUAL-PLATE METEOROID SHIELDS: A NEW ANALYSIS
Hallock F. Swift, Robert Bamford, and Ralph Chen 1 Mar. 1982 98 p refs
(Contract NAS7-100)
(NASA-CR-169143; JPL-Pub-82-39; NAS 1.26:169143) Avail: NTIS HC A05/MF A01 CSCL 22B

Physics governing ultrahigh velocity impacts onto dual-plate meteor armor is discussed. Meteoroid shield design methodologies are considered: failure mechanisms, qualitative features of effective meteoroid shield designs, evaluating/processing meteoroid threat models, and quantitative techniques for optimizing effective meteoroid shield designs. Related investigations are included: use of Kevlar cloth/epoxy panels in meteoroid shields for the Halley's Comet intercept vehicle, mirror exposure dynamics, and evaluation of ion fields produced around the Halley Intercept Mission vehicle by meteoroid impacts. N.W.

N82-29352*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPACECRAFT DRAG-FREE TECHNOLOGY DEVELOPMENT: ON-BOARD ESTIMATION AND CONTROL SYNTHESIS
R. W. Key, E. Mettler, M. H. Milman, and D. B. Schaechter 15 May 1982 89 p refs Sponsored by NASA
(NASA-CR-169141; JPL-Pub-82-45; NAS 1.26:169141) Avail: NTIS HC A05/MF A01 CSCL 22B

Estimation and control methods for a Drag-Free spacecraft are discussed. The functional and analytical synthesis of on-board estimators and controllers for an integrated attitude and translation control system is represented. The framework for detail definition and design of the baseline drag-free system is created. The techniques for solution of self-gravity and electrostatic charging problems are applicable generally, as is the control system development. Author

N82-29353*# Boeing Co., Seattle, Wash.
DEVELOPMENT OF PRELIMINARY DESIGN CONCEPT FOR MULTIFUNCTION DISPLAY AND CONTROL SYSTEM FOR ORBITER CREW STATION. TASK 3: CONCEPT ANALYSIS Progress Report
R. J. Spiger, R. J. Farrell, and G. A. Holcomb 1982 119 p refs
(Contract NAS9-16445)
(NASA-CR-167709; NAS 1.26:167709; D180-27106-1) Avail: NTIS HC A06/MF A01 CSCL 22B

The access schema developed to access both individual switch functions as well as automated or semiautomated procedures for the orbital maneuvering system and electrical power and distribution and control system discussed and the operation of the system is described. Feasibility tests and analyses used to define display parameters and to select applicable hardware choices for use in such a system are presented and the results are discussed. S.L.

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N82-29354*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

A NEW STRATEGY FOR EFFICIENT SOLAR ENERGY CONVERSION: PARALLEL-PROCESSING WITH SURFACE PLASMONS

Lynn Marie Anderson 1982 13 p refs Presented at the 17th Intersoc. Energy Conversion Eng. Conf., Los Angeles, 8-13 Aug. 1982; sponsored by IEEE

(NASA-TM-82867; E-1236; NAS 1.15:82867) Avail: NTIS HC A02/MF A01 CSCL 10A

An advanced concept for direct conversion of sunlight electricity, which aims at high efficiency by tailoring the conversion process to separate energy bands within the broad solar spectrum is introduced. The objective is to obtain a high level of spectrum-splitting without sequential losses or unique materials for each frequency band. In this concept, sunlight excites a spectrum of surface plasma waves which are processed in parallel on the same metal film. The surface plasmons transport energy to an array of metal-barrier-semiconductor diodes, where energy is extracted by inelastic tunneling. Diodes are tuned to different frequency bands by selecting the operating voltage and geometry, but all diodes share the same materials. Author

N82-29355*# Colorado State Univ., Fort Collins. Dept. of Physics.

PLASIM: A COMPUTER CODE FOR SIMULATING CHARGE EXCHANGE PLASMA PROPAGATION Final Report

Raymond S. Robinson, William D. Deininger, Dale R. Winder, and Harold R. Kaufman Jan. 1982 126 p refs Prepared for JPL

(Contract JPL-955322)

(NASA-CR-169209; NAS 1.26:169209) Avail: NTIS HC A07/MF A01 CSCL 21C

The propagation of the charge exchange plasma for an electrostatic ion thruster is crucial in determining the interaction of that plasma with the associated spacecraft. A model that describes this plasma and its propagation is described, together with a computer code based on this model. The structure and calling sequence of the code, named PLASIM, is described. An explanation of the program's input and output is included, together with samples of both. The code is written in ANSI Standard FORTRAN. Author

N82-29356# Naval Sea Systems Command, Washington, D.C.

MK 66 ROCKET SIGNATURE REDUCTION

James D. Habersat Apr. 1982 21 p refs Presented at the 19th Ann. Tech. Symp. of the Assoc. of Sci. and Engr., Washington, D.C., 1982

(AD-A114222) Avail: NTIS HC A02/MF A01 CSCL 21/9

A limited signature reduction study for the 2.75-inch rocket was conducted. The objective of the study was to reduce the visible signature of the rocket motor. The rocket motor used for demonstration tests was the MK 66, which burns for approximately one second. It contains a double-base, non-aluminized propellant. The visible signature is primarily smokeless, consisting mainly of a bright orange flame resulting from afterburning of the fuel-rich exhaust. The technical approach consisted of incorporating additional potassium sulfate (K2SO4) with an ablative binder into internal rocket motor components. During motor firing, erosion of the binder released K2SO4 into the combustion gases. The resulting potassium ions served to inhibit secondary combustion in the exhaust plume. Modified motors were static fired and afterburning results compared to those for an unmodified MK 66 motor firing. For the modified motors, there was no visible signature over the first half (0-0.5 seconds) of the motor burn time. This is a significant improvement over the nominally 0.1 second flashless interval for the unmodified motor. GRA

N82-29357# Nevada Univ., Reno. Dept. of Chemical and Metallurgical Engineering.

SMOKE DYNAMICS OF SOLID ROCKET PLUMES Final Report

Eugene Miller 22 Apr. 1982 5 p refs

(Grants DAAG29-75-G-0082; DAAG29-76-G-0089; DAAG29-76-G-0037)

(AD-A114259; ARO-15587.3-A-GS; ARO-13036.1A-GS; ARO-13655.5-A-GS) Avail: NTIS HC A02/MF A01 CSCL 21/8

The formation of secondary smoke in a solid rocket plume and the attenuation of a laser signal through it have been modeled by codes DROP-4 and OSA-4. Condensation nuclei have been characterized and number and size distribution measured from data obtained in the U.S. Army Missile Command's Smoke Characterization Facility. Predictions from DROP-4 and OSA-4 compare satisfactorily with experimental flight data.

Author (GRA)

N82-30218 Software and Engineering Associates, Inc., Santa Ana Heights, Calif.

A NOZZLE CONTOUR OPTIMIZATION MODULE (NCO) FOR THE IMPROVED SOLID PERFORMANCE PROGRAM (SPP)

Gary R. Nickerson and Lanh D. Dang *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 25-50 (For primary document see N82-30216 20-99)

Avail: Issuing Activity CSCL 21/8

N82-30220 Atlantic Research Corp., Gainesville, Va.

NOZZLELESS PERFORMANCE PROGRAM

I. M. Procinsky, J. W. Murray, A. J. Mikeska, and M. E. Tonkin *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 69-79 Prepared in cooperation with Software and Engineering Associates, Inc., Santa Ana Heights, Calif. (For primary document see N82-30216 20-99)

Avail: Issuing Activity CSCL 21/8

N82-30222 Software and Engineering Associates, Inc., Santa Ana Heights, Calif.

INTERIOR BALLISTICS CALCULATIONS FOR THE NOZZLELESS PERFORMANCE PROGRAM (NPP)

Douglas E. Coats and Lanh D. Dang *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 98-98 Sponsored by AFRPL Prepared for Atlantic Research Corp., Gainesville, Va. (For primary document see N82-30216 20-99)

Avail: Issuing Activity CSCL 21/8

N82-30225 Acurex Corp., Mountain View, Calif.

PARTICLE IMPACT EROSION (PIE) ENTRANCE-THROAT RECESSION PREDICTION METHODOLOGY

M. Abbett and Z. Chiba *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 135-158 (For primary document see N82-30216 20-99)

Avail: Issuing Activity CSCL 21/8

N82-30227 Purdue Univ., Lafayette, Ind.

ANALYSIS OF UNSTEADY AND STEADY THREE-DIMENSIONAL FLOWFIELDS IN SOLID PROPELLANT ROCKET MOTORS

J. D. Hoffman *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 169-203 (For primary document see N82-30216 20-99)

Avail: Issuing Activity CSCL 21/8

N82-30229 Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
JANNAF PERFORMANCE STANDARDIZATION SUBCOMMITTEE Annual Report, 1981
Daweel George *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 231-246 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

N82-30234 Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
PERFORMANCE MEASUREMENTS
C. W. Beckman *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 297-305 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N82-29358* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
METHOD FOR FORMING PYRRONE MOLDING POWDERS AND PRODUCTS OF SAID METHOD Patent
Charles T. Hughes (Avco Corp., Cincinnati) and Robert J. McHenry, inventors (to NASA) (Avco Corp., Cincinnati) Issued 18 Apr. 1972 6 p Filed 17 Nov. 1969 Sponsored by NASA
(NASA-Case-LAR-10423-1; US-Patent-3,657,190; US-Patent-Appl-SN-877445; US-Patent-Class-260-65) Avail: US Patent and Trademark Office CSCL 07C

The formation of pyrrone resins of the ladder or semiladder structure is described. The technique involves initial formation of fully cyclized prepolymers having an average degree of polymerization of about 1.5, one with acidic terminal groups, another with amine terminal groups. Thereafter the prepolymers are intimately admixed on a 1:1 stoichiometric basis. The resulting powder mixture is molded at elevated pressures and temperatures to form a fully cyclized resin.
Official Gazette of the U.S. Patent and Trademark Office

N82-29359# Oak Ridge National Lab., Tenn.
METALS AND CERAMICS DIVISION Annual Progress Report, period ending 30 Jun. 1981
Irene Brogden, ed. Sep. 1981 75 p refs
(Contract W-7405-eng-26)
(ORNL-5810) Avail: NTIS HC A04/MF A01

Engineering materials, including materials compatibility, mechanical properties, nondestructive testing, pressure vessel technology, and welding and brazing are discussed. Fuels and processes, including ceramic technology, fuel cycle and engineering analysis, fuels evaluation, and metals processing are reviewed. Materials science is discussed, covering alloying behavior and design, physical properties, radiation effects and microstructural analysis, structural ceramics, surface and solid state reactions, theory, and X-ray research. Metallography, a high-temperature materials laboratory, and new research iniatives are included.
N.W.

N82-29360# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
THE SOLUBILITY OF OXYGEN AND CARBON DIOXIDE IN CERTAIN LIQUID ORGANIC COMPOUNDS OF FLUORINE AND IN EMULSIONS FROM THEM
I. N. Kuznetsova and N. Sh. Gokhman 1982 9 p Transl. into ENGLISH from Probl. Gematol. i Pereliv. Krovi (Leningrad), no. 6, 1981 p 51-54
(NRC/CNR-TT-2022; ISSN-0077-5606) Avail: NTIS HC A02/MF A01

The solubility of oxygen and carbon dioxide in a number of organic fluorine compounds at various temperatures is reported. Formulas for calculating the oxygen content of organic fluorine emulsions are presented and the calculated results on the oxygen capacity of the emulsions compared with experimental data from the literature. A nomogram for determining the oxygen content or absorption from emulsions having a perfluoro tributyl amine base is constructed.
J.D.

N82-29361# California Univ., Los Angeles. Dept. of Chemistry.
THE CROWN ETHER PROMOTED BASE DEGRADATION OF p-CARBORANE
David C. Busby and M. Frederick Hawthorne 20 Apr. 1982 16 p refs Submitted for publication
(Contract N00014-76-C-0390; NR Proj. 053-608)
(AD-A114718; TR-117) Avail: NTIS HC A02/MF A01 CSCL 07/3

Para-carborane is degraded in high yield via reaction with KOH solubilized in benzene by 18-crown-6. The preparation of representative metallocarboranes from the resultant nido-2,9-C2B9H12-carborane anion is reported.
Author (GRA)

24 COMPOSITE MATERIALS

Includes laminates.

N82-29362* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ABSORBENT PRODUCT TO ABSORB FLUIDS Patent
Frederi . S. Dawn and James V. Correale, inventors (to NASA) Issued 6 Jul. 1982 6 p Filed 24 Dec. 1980 Supersedes N81-16127 (19 - 07, p 0870)
(NASA-Case-MSC-18223-1; US-Patent-4,338,371; US-Patent-Appl-SN-219681; US-Patent-Class-428-283; US-Patent-Class-128-280; US-Patent-Class-128-283; US-Patent-Class-128-284; US-Patent-Class-128-285; US-Patent-Class-128-288; US-Patent-Class-128-291; US-Patent-Class-128-296; US-Patent-Class-428-284; US-Patent-Class-428-286; US-Patent-Class-428-287; US-Patent-Class-428-288) Avail: US Patent and Trademark Office CSCL 11D

A multi-layer absorbent product for use in contact with the skin to absorb fluids is discussed. The product utilizes a water pervious facing layer for contacting the skin, overlayed by a first fibrous wicking layer, the wicking layer preferably being of the one-way variety in which fluid or liquid is moved away from the facing layer. The product further includes a first container section defined by inner and outer layer of a water pervious wicking material between which is disposed a first absorbent mass. A second container section defined by inner and outer layers between which is disposed a second absorbent mass and a liquid impermeable/gas permeable layer. Spacesuit applications are discussed.
Official Gazette of the U.S. Patent and Trademark Office

N82-29363*# Hughes Aircraft Co., Torrance, Calif. Electron Dynamics Div.
PYROLYTIC GRAPHITE COLLECTOR DEVELOPMENT PROGRAM Final Report
William J. Wilkins 25 Feb. 1982 123 p refs
(Contract NAS3-22505)
(NASA-CR-167909; NAS 1.26:167909; W-09170) Avail: NTIS HC A06/MF A01 CSCL 11D

Pyrolytic graphite promises to have significant advantages as a material for multistage depressed collector electrodes. Among these advantages are lighter weight, improved mechanical stiffness under shock and vibration, reduced secondary electron backstreaming for higher efficiency, and reduced outgassing at higher operating temperatures. The essential properties of pyrolytic graphite and the necessary design criteria are discussed. This includes the study of suitable electrode geometries and methods of attachment to other metal and ceramic collector components consistent with typical electrical, thermal, and mechanical requirements.
Author

N82-29364# Manville Service Corp., Denver, Colo. Research and Development Center.
EVALUATION OF INSULATION MATERIALS AND COMBINATIONS FOR BULKHEAD FIRE PROTECTION Final Report

R. S. Wulliman 20 Jan. 1982 184 p
(Contract N00173-80-C-0413)
(AD-A110564) Avail: NTIS HC A09/MF A01 CSCL 11/4

The extensive use of aluminum in the bulkheads and superstructure of Naval vessels has introduced a need for a more effective fire protection system at a lower weight per square foot than traditionally utilized systems. The objectives of this contract were: to study a variety of insulation materials and systems for their fire protection and weight per square foot characteristics; and to evaluate insulation materials and systems properties to assist in the choice of the most efficient material or system for the range of fire protection and weight per square foot criteria. The objectives were accomplished through a combination of extensive computer studies of materials using the HEATING5 computer program and supportive small scale laboratory fire testing using a two foot by two foot furnace. Most studies were conducted using the ASTM-E119 time/temperature curve as the simulated fire. Several types of materials and systems were evaluated, including refractory fiber insulations, opacified particulates, foam, mineral fiber, and intumescent paint coatings. GRA

N82-29365# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
DAMPING CHARACTERISTICS OF METAL COMPOSITES Final Report, Mar. 1981 - Jan. 1982
Nancy S. Timmerman Apr. 1982 31 p refs
(Contract DAAG46-81-C-0036; DA Proj. 1L2-63102-D-071)
(AD-A114633; BBN-4864; AMMRC-TR-82-19) Avail: NTIS HC A03/MF A01 CSCL 11/4

Nine metal matrix composite materials were tested over the frequency range 4 to 10,000 Hz, at room temperature, to determine their damping properties. Cantilever beam samples were measured using both a logarithmic decrement test and a resonant dwell test to cover the entire frequency range. At a peak stress of 5 ksi, measured loss factors ranged from about .0003 to .004, with the graphite/aluminum composites generally showing the best (highest) performance (loss factor). These values are measurably no greater than those obtainable on the unreinforced matrix alloys. Author (GRA)

N82-29366# Calspan Field Services, Inc., Arnold Air Force Station, Tenn.
WIND TUNNEL TESTS OF THE NASA SHUTTLE EXTERNAL TANK SLA/SOFI Final Report
R. G. Meyers AEDC Jun. 1981 26 p refs
(AF Proj. 921E)
(AD-A114678; AEDC-TSR-81-P26) Avail: NTIS HC A03/MF A01 CSCL 11/1

A test was conducted to determine whether exposure of the Super Light Ablator/Spray-on-Foam Insulation (SLA/SOFI) to the STS-1 launch trajectory dynamic pressures would produce additional cracks or cause separations from the cryogenic tank. Low-speed movies and stereo-photography were used to record the effects of the tunnel flow at free-stream Mach numbers from 0.60 to 1.50. Four configurations were tested in the Propulsion Wind Tunnel (16T) during the period from March 20 through 21, 1981. Author (GRA)

N82-29367# California Univ., Los Angeles. School of Engineering and Applied Science.
EXPERIMENTAL DETERMINATION OF STRESSES IN DAMAGED COMPOSITES USING AN ELECTRIC ANALOGUE Technical Progress Report, 1981 - 1982
S. B. Batdorf May 1982 18 p refs
(Contract N00014-76-C-0445)
(AD-A114620; UCLA-ENG-82-36) Avail: NTIS HC A02/MF A01 CSCL 12/1

Inadequate knowledge of the local stress distributions in damaged composites has been a major obstacle to progress in the understanding of damage accumulation and ultimate failure of such materials. Theoretical treatments of 3-dimensional uniaxially reinforced composites are difficult, and direct experimental observations of stresses around interior flaws are not feasible. An experimental determination of stress distributions can be made using an electric analogue. A scaled model of the composite including the damage is made with the fibers replaced by conducting rods and the matrix replaced by an electrolyte. The resistivity ratio of rods to electrolyte is taken equal to the elastic modulus ratio of matrix to fiber. A tensile force applied in the fiber direction is modelled by applying a potential gradient in the rod direction. The displacement distribution in the composite is them modelled by the potential distribution in the analogue to an accuracy somewhat better than that given by shear lag theory. Thus stress distributions can be found by measuring potentials in the analogue with the aid of an electric probe. Author (GRA)

N82-29368# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
STUDY OF A PROPRIETARY POZZOLANIC PRODUCT
Alan D. Buck May 1981 9 p
(Contract DE-AI97-81ET-46633)
(DE82-006005; ONWI-249; USAE-WES-SL-81-8) Avail: NTIS HC A02/MF A01

Constituents in a proprietary anticorrosion admixture (AD-644) for concrete were identified by petrographic examination and chemical analysis. Petrographic examination included X-ray diffraction, light microscopy, and scanning electron microscopy. The CaO content of the sample was determined by chemical analysis to estimate cement content of the sample. It is indicated that the admixture was largely silica fume containing about 12% portland cement and a small amount of organic material which is a water reducing admixture. A known silica fume (AD-536(2)) was used to show that silica fume is the principal constituent of this admixture (AD-644). DOE

N82-29369# California Univ., Berkeley. Lawrence Berkeley Lab. Div. of Materials and Molecular Research.
LIQUID-PHASE DENSIFICATION OF TITANIUM CARBIDE-NICKEL COMPOSITES Ph.D. Thesis
Daniel John Miller Nov. 1981 92 p refs
(Contract W-7405-eng-48)
(DE82-007616; LBL-13580) Avail: NTIS HC A05/MF A01

Liquid phase sintering of titanium carbide nickel composites was studied by high temperature scanning electron microscopy. The sintering kinetics were strongly dependent upon additions of free carbon to the system. Densification was progressively decreased with increasing carbon additions. These results are noted from changes in the eutectic reaction in the system, reduced solubility of titanium carbide in liquid phase, and decreased wetting of the solid by the liquid. The influence of hydrogen heat treatment of particle compacts prior to sintering was also investigated. This processing resulted in the reduction of densification rates and elevated temperatures of liquid phase formation. Wetting experiments on hydrogen treated materials showed a time dependent contact angle. Wetting theory and reactions predicted by the equilibrium ternary diagram are discussed. DOE

N82-30268# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
FREE-EDGE EFFECTS IN COMPOSITE SYMMETRIC LAMINATED PLATES
D. Engrand *In its* La Rech. Aerospatiale Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 59-63 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N82-29370* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AQUEOUS ALKALI METAL HYDROXIDE INSOLUBLE CELLULOSE ETHER MEMBRANE Patent

Howard E. Hoyt (Borden, Inc., New York) and Helmuth L. Pfluger, inventors (to NASA) (Borden, Inc., New York) Issued 6 May 1969 3 p Filed 6 Apr. 1965 Sponsored by NASA
(NASA-Case-XGS-05584-1; NASA-Case-XGS-07375-1; NASA-Case-XGS-07397-1; US-Patent-3,442,674; US-Patent-Appl-SN-446071; US-Patent-Class-106-197) Avail: US Patent and Trademark Office CSCL 07D

A membrane that is insoluble in an aqueous alkali metal hydroxide medium is described. The membrane is a resin which is a water-soluble C2-C4 hydroxyalkyl cellulose ether polymer and an insolubilizing agent for controlled water sorption, a dialytic and electrodialytic membrane. It is particularly useful as a separator between electrodes or plates in an alkaline storage battery.
Official Gazette of the U.S. Patent and Trademark Office

N82-29371* National Aeronautics and Space Administration. Pasadena Office, Calif.
COAL DESULFURIZATION BY AQUEOUS CHLORINATION Patent
John J. Kalvinskas (JPL, California Inst. of Tech., Pasadena), Nick Vasilakos (JPL, California Inst. of Tech., Pasadena), William H. Corcoran (JPL, California Inst. of Tech., Pasadena), Karel Grohmann (JPL, California Inst. of Tech., Pasadena), and Naresh K. Rohatgi, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 20 Apr. 1982 11 p Filed 12 May 1980 Sponsored by NASA
(NASA-Case-NPO-14902-1; US-Patent-4,325,707; US-Patent-Appl-SN-156790; US-Patent-Class-44-1SR; US-Patent-Class-201-17) Avail: US Patent and Trademark Office CSCL 07D

A method of desulfurizing coal is described in which chlorine gas is bubbled through an aqueous slurry of coal at low temperature below 130 C, and at ambient pressure. Chlorinolysis converts both inorganic and organic sulfur components of coal into water soluble compounds which enter the aqueous suspending media. The media is separated after chlorinolysis and the coal dechlorinated at a temperature of from 300 C to 500 C to form a non-caking, low-sulfur coal product.
Official Gazette of U.S. Patent and Trademark Office

N82-29372# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
OXYGEN-TRANSPORTING COMPOUNDS
Itiro Tyuma 1982 34 p refs Transl. into ENGLISH from Kagaku Zokan (Japan), no. 89, 1981 p 25-39
(NRC/CNR-TT-2020; ISSN-0077-5606) Avail: NTIS HC A03/MF A01

The principal characteristics of the oxygen-transporting proteins found in nature are summarized. All of the compounds listed are macromolecules consisting of monomers with a molecular weight exceeding 10,000 each. Two typical respiratory proteins, hemoglobin and myoglobin, are discussed. Artificial protein models are considered. Fluorocarbon derivatives as artificial oxygen carriers are discussed. Author

N82-29373*# Houston Univ., Tex. Dept. of Chemistry.
DEVELOPMENT OF AND FABRICATION OF HIGH RESOLUTION GAS CHROMATOGRAPHIC CAPILLARY COLUMNS Final Report
Albert Zlatkis May 1982 24 p refs
(Contract NAS9-16351)
(NASA-CR-167631; NAS 1.26:167631) Avail: NTIS HC A02/MF A01 CSCL 07D

Gas chromatographic columns which are used in the trace gas analyzer (TGA) for the space shuttle are coated with a polyoxyethylene lauryl ether. This stationary phase is of medium polarity and has a temperature limit of 160 C. A polymer for this application which has an improved thermal stability is investigated. The use of fused silica capillary columns with specially bonded phases as well as an introduction system (on column) was also studied. S.L.

N82-29374*# Cornell Univ., Ithaca, N. Y. Lab. of Atomic and Solid State Physics.
CRITICAL FIELDS OF LIQUIDS OF LIQUID SUPERCONDUCTING METALLIC HYDROGEN
J. Jaffe and N. W. Ashcroft Jul. 1982 14 p refs
(Grant NAG2-159)
(NASA-CR-169160; MSC-4775; NAS 1.26:169160) Avail: NTIS HC A02/MF A01 CSCL 07D

Liquid metallic hydrogen, in a fully dissociated state, is predicted at certain densities to pass from dirty to clean and from type II to type I superconducting behavior as temperature is lowered. Author

N82-29375*# California Univ., Davis. Dept. of Physics.
PERFORMING SPECTROSCOPIC AND SPECIFIC HEAT STUDIES OF IMPROPER FERROELECTRICS Final Report
Lawrence B. Coleman [1982] 17 p refs Prepared for JPL
(Contract JPL-955734)
(NASA-CR-169204; JPL-9950-698; NAS 1.26:169204) Avail: NTIS HC A02/MF A01 CSCL 07D

The results of infrared measurements on Ni-Br, Cu-Cl, and Fe-I boracite improper ferroelectrics and far infrared measurements of Ni-Br boracite are presented. The boracites have the general formula X3B7O3Y, where X = divalent metal and Y = halogen. They undergo a first order phase transition from a high temperature paraelectric phase with cubic symmetry to a ferroelectric phase with orthorhombic symmetry. The boracites are 'improper ferroelectrics' since the spontaneous polarization is not the primary order parameter in the cubic-orthorhombic phase transition. Current understanding of these materials is that the primary order parameter is associated with a doubly degenerate zone-boundary phonon in the cubic phase. The degenerate critical modes become homogeneous and split into the A sub 1 and A sub 2 modes in the orthorhombic phase, doubling the volume of the primitive cell. An harmonic coupling between the softing A sub 1 and a low frequency A sub 1 optic mode induces a spontaneous polarization as a secondary effect in the ferroelectric phase. This secondary non-critical nature of the ferroelectric mode earns these materials the 'improper' title and is responsible for their unique properties and high figure of merit in detector use. J.D.

N82-29376*# Pennsylvania State Univ., University Park. Fuels and Combustion Lab.
PLANE FLAME FURNACE COMBUSTION TESTS ON JPL DESULFURIZED COAL Final Technical Report
James J. Reuther, H. T. Kim, and J. G. H. Lima 15 May 1982 73 p refs Prepared for JPL
(Contract JPL-956123)
(NASA-CR-169199; NAS 1.26:169199; PSU-FCL-C-82-345) Avail: NTIS HC A04/MF A01 CSCL 21B

The combustion characteristics of three raw bituminous (PSOC-282 and 276) and subbituminous (PSOC-230) coals, the raw coals partially desulfurized (ca -60%) by JPL chlorinolysis, and the chlorinated coals more completely desulfurized (ca -75%) by JPL hydrodesulfurization were determined. The extent to which the combustion characteristics of the untreated coals were altered upon JPL sulfur removal was examined. Combustion conditions typical of utility boilers were simulated in the plane flame furnace. Upon decreasing the parent coal volatile matter generically by 80% and the sulfur by 75% via the JPL desulfurization process, ignition time was delayed 70 fold, burning velocity was retarded 1.5 fold, and burnout time was prolonged 1.4 fold. Total flame residence time increased 2.3 fold. The JPL desulfurization process appears to show significant promise for producing technologically combustible and clean burning (low SO3) fuels. J.D.

N82-29377*# Bend Research, Inc., Oreg.
MEMBRANE SEPARATION TECHNOLOGY IN THE 1980'S Final Report
H. K. Lonsdale 2 Mar. 1982 45 p refs Prepared for JPL
(Contracts NAS7-100; JPL-956158)
(NASA-CR-169203; NAS 1.26:169203; Rept-46-1) Avail: NTIS HC A03/MF A01 CSCL 07D

The current status of membrane technology is assessed and industrial processes in which membrane technology could effect energy savings or other advantages are identified. The extension of current trends is recommended; i.e., the development of ultrathin and highly permselective membranes, the use of specific carriers to enhance permselectivity and permit 'uphill' diffusion, and the improvement of separation efficiency. Membranes are predicted to be important in biotechnology and in the production of solar energy. Guidelines indicating where and how to look for

opportunities where evolving membrane technology might fit are provided. J.D.

N82-29378# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemistry.
LINEAR SWEEP VOLTAMMETRY OF ADSORBED NEUTRAL RED Interim Technical Report
S. E. Creager, G. T. Marks, D. A. Aikens, and H. H. Richtol May 1982 40 p refs Submitted for publication
(Contract N00014-78-C-0494; NR Proj. 051-679)
(AD-A114975; TR-4) Avail: NTIS HC A03/MF A01 CSCL 11/3

The strong adsorption of neutral red on mercury causes its linear sweep voltammetry to be adsorption controlled over a wide range of conditions. At ph 4.5 or below, the surface coverage of DH(+) increases monotonically from 1 monolayer in 3 x 10 to the -7th power M solution to ca 3 monolayers in 3 x .0001 M solution, and to a good approximation the monomeric, dimeric and tetrameric forms of the dye are absorbed equally strongly. The morphology of the adsorption peak indicates that interactions between adsorbed molecules are substantial and that the nature of these interactions changes from moderately repulsive below pH 4 to strongly attractive above pH 6. Over this pH range the voltammograms of 2 x .0001 M dye narrow progressively and ultimately split into two extremely sharp peaks. The first of these corresponds to the single voltammetric peak observed for dilute dye solutions, whereas the second represents the reduction of an electrochemically distinguishable phase of adsorbed dye. Above pH 9 the isotherm for adsorption of D exhibits an abrupt increase when the bulk concentration exceeds the equilibrium solubility. Author (GRA)

N82-29379# Battelle Columbus Labs., Ohio.
FURTHER STUDIES ON THE KINETICS OF Ni(CO)4 FORMATION Final Technical Report, 1 Dec. 1980 - 28 Feb. 1982
Lynn T. Redmon 23 Apr. 1982 37 p refs
(Grant AF-AFOSR-0034-81; AF Proj. 2301)
(AD-A114913; AFOSR-82-0411TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

Semi-empirical calculations were performed for small clusters modeling the adsorption of CO on nickel (100), (110), and (111) surfaces at low and high coverage levels and on nickel-copper alloy (100) surfaces at low coverage. The bearing of the results upon the understanding of experimentally observed faceting and magnetization (Hedvall) effects is discussed. A preference for adsorption at multifold sites is observed at low coverage, and the (100) and (111) surfaces are predicted to be energetically smooth at high coverages. The results for alloy surfaces are qualitatively in agreement with experiment. Author (GRA)

N82-29380# Maine Univ., Orono. Lab. for Surface Science and Technology.
PHASE TRANSITIONS ON SURFACES. AN INTERNATIONAL CONFERENCE. ABSTRACTS PROGRAM Final Report, 30 Jun. - 31 Dec. 1981
P. Kleban and W. N. Unertl 16 Apr. 1982 116 p refs Conf. held at Orono, Maine, 3-7 Aug. 1981
(Contract N00014-81-G-0064; Grant AF-AFOSR-0212-81; AF Proj. 2306)
(AD-A114897; AFOSR-82-0397TR) Avail: NTIS HC A06/MF A01 CSCL 07/4

The central theme of the international conference on Phase Transitions on Surfaces is phase transitions in two dimensions and equilibrium properties of surface systems. A secondary theme is the relationship of these topics to other areas of surface and interface science and technology and to statistical mechanics. A principal motivation for this conference is to promote closer communication between the various research communities involved in studies of surface phase behavior, statistical mechanics in two dimensions and related topics. In spite of overlapping interests, such communication has not always been fully developed, partly because of the large volume of research and partly because of the 'natural' division of the subject into various sub-fields such as physisorption and chemisorption. Furthermore, the knowledge gained from studies of phase transitions has important applications in many diverse areas of science and technology. These range from universality in phase transitions and quark confinement to epitaxial growth, heterogeneous catalysis and electrode behavior in electrochemical processes. The potential for scientific advances is obvious. We hope these abstracts reflect a significant part of the intellectual excitement as well as the scientific content of the meeting. Author (GRA)

N82-29381# State Univ. of New York, Buffalo. Dept. of Chemistry.
RAMAN STUDY OF SOLID STATE REACTIONS IN POLYMERIC MATERIALS Final Report, 1 Sep. 1978 - 31 Aug. 1981
Paras N. Prasad Aug. 1981 35 p
(Grant AF-AFOSR-0287-80; AF Proj. 2303)
(AD-A114774; AFOSR-82-0204TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

This research accomplished under this grant focused on intermolecular interaction and reaction dynamics of several monomeric as well as polymeric systems. Specifically the following research areas were investigated: (1) Vibrational relaxation in organic solids. This study was necessitated from a need to formulate conditions under which a selective vibrational as well as a phonon excitation could be used to produce novel products by state selected chemistry; (2) Phonon spectroscopy of reactions in solids. This novel method was used to determine the mechanism of reactions and the role of phonons in reactivity of solids; (3) Raman phonon study of pharmaceutical solids in relation to their bioavailability. The method of Raman phonon spectroscopy was introduced as a convenient method to study various solid state forms of a given drug and their physical and chemical stabilities; (4) Structure and dynamics of the conducting complex: (Benzophenone)9 (KI)2 I7 CHCl3. Some preliminary work was done on this novel group of conducting materials; and (5) Phonon spectroscopy of polymeric alloy. This new method was introduced to determine the molecular homogeneities of polymer blends. Author (GRA)

N82-29382# Washington Univ., Seattle. Lab. for Chemometrics.
QUANTITATIVE RESOLUTION OF FUSED CHROMATOGRAPHIC PEAKS IN GAS CHROMATOGRAPHY/MASS SPECTROMETRY Interim Report
Muhammad Abdallah Sahraf and Bruce R. Kowalski May 1982 40 p refs Submitted for publication
(Contract N00014-75-C-0536; NR Proj. 051-565)
(AD-A114874; TR-23) Avail: NTIS HC A03/MF A01 CSCL 07/4

Curve resolution and the generalized inverse method are used to calculate the molar compositions of mixture mass spectra acquired during coelution of unseparated GC peaks. Quantitative resolution of the GC signal, independent of peak shape, results. The effects of noise, peak separation, a drifting base line and peak tailing are studied. No assumptions of peak shape or the presence of unique masses for the pure components are required. GRA

N82-29383# Wright State Univ., Dayton, Ohio.
MASS SPECTROMETRIC MEASUREMENTS OF THE CONCENTRATIONS OF GASEOUS SPECIES IN REACTIVE FLOW SYSTEMS Final Technical Report, 11 Sep. 1978 - 10 Sep. 1981
C. Chang and T. O. Tiernan Wright-Patterson AFB, Ohio AFWAL Apr. 1982 222 p refs
(Contract F33615-78-C-2066; AF Proj. 2308)
(AD-A114854; AFWAL-TR-81-2139) Avail: NTIS HC A10/MF A01 CSCL 07/4

This final report summarizes progress realized in the development and utilization of a gas diagnostics system for use in evaluating ramjet combustor performance. The work accomplished is described in four sections. In the first section, the results of several series of cold flow sampling tests are presented. Several detailed simulated fuel concentration profiles were determined for the flowfield of the ramjet combustor which was studied. This ramjet combustor can be operated in both dump combustor and ducted rocket combustor configurations. The second section of the report reviews progress achieved in the development of methodology and calibration procedures for monitoring several compounds of interest in an active combustion environment, including O2, CO, CO2, H2O, and hydrocarbon

fuels. The third section describes the construction of a flat flame burner system and its application for flame species profiles measurements. Detailed profiles of several stable flame species, including N2, O2, CO, CO2, CH4, H2O, and AR, were obtained for both methane/air and methane/oxygen flames. Finally, the fourth section of this report is concerned with the design and construction of an innovative sample probe which consists of a quartz microprobe tip for gas sampling and a water-cooled stainless steel probe body to provide the required physical support and protection for the tip. GRA

N82-29384# Harry Diamond Labs., Adelphi, Md.
CHARGE GENERATION AND RECOMBINATION IN SILICON DIOXIDE FROM HEAVY CHARGED PARTICLES
Timothy R. Oldham Apr. 1982 79 p refs Sponsored in part by ARPA and DARPA
(AD-A114713; HDL-TR-1985) Avail: NTIS HC A05/MF A01 CSCL 07/4

The purpose of this study was to determine the amount of ionization from a heavy charged particle that would escape recombination in a thin SiO2 film. The implications of these findings for the operation of future microelectronic circuits are discussed briefly. The MOS capacitors were irradiated with 2-MeV alpha particles or with 700-keV protons. The flatband voltage shift was determined by using the well-known capacitance--voltage (C-V) technique. This voltage shift is proportional to the amount of ionization that escapes recombination in the SiO2. The experimental results agree very well with a modified version of the columnar recombination model first proposed by George Jaffe in 1913. Jaffe developed an approximate analytical solution that is not entirely satisfactory. However, by using a large digital computer, one can solve Jaffe's exact differential equation numerically. These results are much less than the yield that one would expect for other forms of radiation. For this reason, one can probably conclude that electronic devices will probably not fail from single particle induced ionization until the devices are much smaller than those now on the drawing boards. GRA

N82-29385# Advanced Fuel Research, Inc., East Hartford, Conn.
CHARACTERIZATION OF WYOMING SUBBITUMINOUS COALS AND LIQUEFACTION PRODUCTS BY FOURIER TRANSFORM INFRARED SPECTROMETRY Final Report, May 1980 - May 1981
P. R. Solomon and R. M. Carangelo Nov. 1981 146 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1604-2)
(DE82-901292; EPRI-AP-2115) Avail: NTIS HC A07/MF A01

FTIR analysis were performed on samples of coal to correlate liquefaction yields with coal structure information. Analyses were also performed on recycled solvents to determine whether FTIR spectra may be related to solvent quality. The products of coal liquefaction were examined and compared to the starting material in order to trace the chemistry taking place during the process. To identify and quantify materials being analyzed, a model compound library of molecular species that are important components in coal liquids and recycle solvents was begun. The model compounds were used to develop calibration constants to relate data to the concentration of organic structural components in unknown material. Software was developed to use the library to identify components in a mixture. DOE

N82-29386# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorbauelemente.
EXPERIMENTAL INVESTIGATION ABOUT THE KINETICS OF SULFUR TRIOXIDE-SPLITTING Thesis
E. Savvidis Aug. 1980 100 p refs In GERMAN; ENGLISH summary
(DE82-902153; Juel-1669; ISSN-0366-0885) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

The splitting of the SO3 (SO3 reversible SO2 + 1/2 O2) is the key reaction of the thermochemical cycle process of the sulfuric acid group. Experiments were carried out in a streaming tube which was used as a differential reactor. The homogeneous and the heterogeneous catalytic reactions were investigated in the temperature range between 750 to 950 C and the pressure range between 1 to 37 bars. The evaluation of the results is made using the exponential, Hinshelwood and porous model. The basic calculations for the lay-out of the SO3-splitting reactors are presented. T.M.

N82-29387# Aerojet Energy Conservation Co., Sacramento, Calif.
COMBUSTION ENHANCEMENT AND POLLUTANT CONTROL RESEARCH WITH ACOUSTICALLY INDUCED MIXING Technical Progress Report, Sep. - Dec. 1981
R. J. Faeser and M. I. Rudnicki Jan. 1982 29 p ref
(Contract DE-AC22-81PC-40270)
(DE82-007012; DOE/PC-40270/3) Avail: NTIS HC A03/MF A01

The impression of acoustic energy on the combustion zone of pulverized coal furnaces was evaluated. These benefits include the reduction in NO/sub x/ generation, the increase in combustion intensity, and the increase in turndown ratio (maximum flow/minimum flow). The reason for these possible benefits is the increased relative motion of the gas and coal particles and the fine stirring action resulting from high frequency acoustic waves. The fabrication and checkout of the test facility are completed, combustion testing is initiated, and a more efficient location for the acoustic drivers is identified. DOE

N82-29388# Department of Energy, Oak Ridge, Tenn. Technical Information Center.
ELECTROCHEMISTRY OF SOLID ELECTROLYTES
V. N. Chebotin, ed. and M. V. Perifilev 1981 339 p refs Transl. into ENGLISH of the book "Elektrokhim. Tverdykh Elektrolitov" Moscow, 1978
(DE82-004072; DOE-TR-247; VAAP/SA-81/25) Avail: NTIS HC A15/MF A01

The theory of the main electrochemical phenomena in solid electrolytes and at solid electrolyte-electrode interfaces is described. Experimental methods for studying the properties of cells with solid electrolytes are presented and the main experimental principles are given. Principles of the practical use of solid electrolytes are presented. DOE

N82-29389# Ames Lab., Iowa. Dept. of Chemistry.
MASS-SPECTROMETRIC DETERMINATION OF TRACE ELEMENTS IN AQUEOUS MEDIA WITHOUT PRECONCENTRATION Ph.D. Thesis
Gordon Oluf Foss Oct. 1981 111 p refs
(Contr. W-7405-eng-82)
(DE82-005500; IS-T-931) Avail: NTIS HC A06/MF A01

The feasibility of using a low pressure glow discharge as a ion source for the mass spectrometric determination of trace elements in aqueous media was investigated. A cryogenically cooled hollow cathode ion source was developed to analyze aqueous samples without external preconcentration. Aqueous solutions containing seventy elements were analyzed and the detection limits, sensitivity factors, and linear regression correlation coefficients were determined. A standard test solution of trace elements in water was analyzed and the concentrations of trace elements were calculated using the sensitivity factors determined previously. The results compared favorably within the error limits predicted by the semiquantitative survey methods used. Tap water and natural lake water samples were examined and minimal interference effects due to organic compounds and biological compounds were noted. A research ion optical system (RIOS) was developed as a flexible mass analyzer for the development of new ion sources. The RIOS is a double focussing mass analyzer designed utilizing the Mattauch-Herzog geometry with externally adjustable slit assemblies. DOE

N82-29390# Pittsburg and Midway Coal Mining Co., Englewood, Colo.
SOLVENT-REFINED-COAL (SRC) PROCESS. IDENTIFICATION AND QUANTIFICATION OF TRACE HYDROCARBONS IN SRC-11 PDU P-99 GAS STREAMS
M. L. Weaver Jan. 1982 108 p
(Contract DE-AC05-79ET-10104)
(DE82-007584; DOE/ET-10104/33) Avail: NTIS HC A06/MF A01

Qualitative and quantitative determination of trace components in the key gas streams of the SCR-II Process is needed in order to design the gas purification and recovery systems in the demonstration plant. An analytical procedure for trace hydrocarbon analysis was developed and the trace hydrocarbons

in selected gas streams of process development unit P-99 were identified and quantified. A single column chromatographic method was developed which could detect hydrocarbons were positively identified and quantified, and a number of other hydrocarbons were tentatively identified. DOE

N82-29391# Texaco, Inc., Montebello, Calif. Research Lab.
GASIFICATION OF RESIDUAL MATERIALS FROM COAL LIQUEFACTION. TYPE 1 EVALUATION OF H-COAL LIQUEFACTION RESIDUE FROM ILLINOIS NO. 6 COAL AS A FEEDSTOCK FOR THE TEXACO GASIFICATION PROCESSES
Allen M. Robin Oct. 1981 11 p
(Contracts DE-AC01-76ET-10137; EX-76-C-01-2247)
(DE82-003873; DOE/ET-10137/T1; FE-2247-27) Avail: NTIS HC A02/MF A01

A laboratory evaluation of a 20-pound sample of atmospheric tower bottoms from a coal liquefaction pilot plant was completed. The sample, which was obtained from the liquefaction of Illinois No. 6 coal, was judged to be a suitable feedstock for the Texaco synthesis gas generation process. It can be charged directly to the gasifier at a temperature of about 3500 F. Based on these results, operating conditions and yields were estimated for gasifying 1000 pounds per hour of molten undiluted residue at 1200 psig. DOE

N82-29392# Avco-Everett Research Lab., Mass.
PREIGNITION VOLATILE YIELDS AS RELATED TO COAL CHARACTERISTICS Final Technical Report, 15 Sep. 1980 - 15 Nov. 1981
K. G. Neoh, K. Annamalai, and R. E. Gannon Oct. 1981 73 p refs
(Contract DE-AC22-80PC-30290)
(DE82-005706; DOE/PC-30290/T4) Avail: NTIS HC A04/MF A01

Thirteen coals ranging in rank from lignite to anthracite were tested at two temperatures between 15000 K and 25000 K. Results from these coals showed that the volatile yields obtained under high-heating rate and temperatures are generally higher than the proximate yield. A positive correlation between the high-temperature yield and the carbon content in the coal was obtained, and the effect of the maceral content was found to be secondary to the chemical composition. With the exception of the lignite and sub-bituminous coals, the heating value of the volatiles is equal to or higher than that of the original coal. Investigation of particle size effects were carried out on three of the thirteen coals and the results showed particle size effects to be insignificant in the size range tested. Modeling results from the AERL coal combustion code indicate that volatile yield strongly affects burner design. Predictions obtained from the model are consistent with current burner technology and can serve as a basis for design improvements. DOE

N82-29393# Ellis (George S.), Chardon, Ohio.
ETHANOL PRODUCTION BY VAPOR COMPRESSION DISTILLATION Final Report
George S. Ellis 1981 9 p
(Contract DE-FG02-80R5-10240)
(DE82-004892; DOE/R5-10240/2) Avail: NTIS HC A02/MF A01

It was the goal of the project to develop and demonstrate a one (1) gallon per hour vapor compression distillation unit for fuel ethanol production that could be profitably manufactured and economically operated by individual family units. The unit constructed was originally built for strictly ambient temperature operation, but later modified to permit elevated temperature operation. It successfully separated ethanol from a dilute solution, but only at a very low production rate. The initial configuration had the compressor located outside of the distillation vessel and was losing excessive energy to the environment. Therefore, it would not be possible to operate that design at elevated temperature. Thus, the compressor was moved inside the distillation vessel. DOE

N82-29394# United States Steel Corp., Monroeville, Pa. Research Lab.
STUDIES OF FUNDAMENTAL FACTORS CONTROLLING CATALYZATION OF REACTIONS OF GASES WITH CARBONACEOUS SOLIDS Final Report
R. M. Fisher and A. Szirmae Aug. 1981 21 p refs
(Contracts DE-AC02-77ER-045455; EG-77-C-02-4545)
(DE82-005520; DOE/ER-04545/T1; COO-4545-1) Avail: NTIS HC A02/MF A01

Studies of the effects of catalyst particle size and composition and of reaction temperature on the gasification of graphite in H2 + 2% H2O by dispersed metal catalysts produced a comprehensive understanding of the process. The experimental observations suggest that the role of catalysts is to effect dissociation of H2O. The absorbed H and O adatoms then transfer, that is, spill over, to the carbon surface and combine to form CO and CH4. Spill-over cannot occur if a thin insulating barrier is present between metal and graphite. Gasification is highly localized around each catalyst particle and results in the formation of surface channels and deep pits on single crystals of graphite due to anisotropy in carbon bonding. Similar, but extremely fine, terrace channeling occurs on the graphite microcrystalline aggregates compressed into planchets. The rate of gasification by Fe over a wide range of particle size (approx. 10 nm to 1 mm) is determined by the total surface area. Thus the simple relation that reaction rate equals wt % catalyst/particle size provides a useful guide to the activity of a particular catalyst powder. Transition metal alloys generally show a reduced level of catalytic activity. Ni-Cu alloys are of interest as they were found to produce a desirable increase in the CH4/CO ratio of the product gas. Several readily available forms of highly dispersed iron powder could be used as expendable catalyst additives for coal gasification, particularly to enhance in situ (underground) methods. DOE

N82-29395# Utah Univ., Salt Lake City. Dept. of Mining and Fuels Engineering.
CHEMISTRY AND CATALYSIS OF COAL LIQUEFACTION CATALYTIC AND THERMAL UPGRADING OF COAL LIQUID AND HYDROGENATION OF CO TO PRODUCE FUELS Quarterly Progress Report, Jul. - Sep. 1981
W. H. Wiser Dec. 1981 73 p refs
(Contract DE-AC22-79ET-14700)
(DE82-006094; DOE/ET-14700/8) Avail: NTIS HC A04/MF A01

The hydrogenation activity of a series of HDS catalysts correlated well with O2 chemisorption and surface dispersion measured by ESCA; however, the HDS activity showed poor correlation with both techniques. The implication is that hydrogenation most likely takes place at edge sites on the basic MoS2 crystallites and HDS at different, yet unknown site locations. Chemisorption, X ray diffraction, and ESCA measurements demonstrated that MnO is concentrated on the surface of the basic Fe particles in reduced Fe-Mn Fischer Tropsch catalysts. DOE

N82-29396# Princeton Univ., N. J. Dept. of Chemical Engineering.
CAPTIVE SAMPLE REACTOR FOR KINETIC STUDIES OF COAL PYROLYSIS AND HYDROPYROLYSIS ON SHORT TIME SCALES
S. J. Niksa, W. B. Russel, and D. A. Saville 1981 25 p refs
(Contract DE-AC01-79ET-13153)
(DE82-000747; DOE/ET-13153/T6) Avail: NTIS HC A02/MF A01

An apparatus was designed for kinetic studies of coal devolatilization under closely controlled heating rates, temperatures, and ambient pressures over a wide range of solids reaction time. The system features a wire mesh pyrolysis furnace driven by an electronically controlled power supply to ensure uniform heating rates and precise crossover to a variable length isothermal period. A gas stream flowing across the support eliminates secondary product degradation and a novel quenching scheme permits resolution in 0.1 second time intervals, extending the sensitivity of kinetic measurements from the first increments of pyrolysis through completion of primary devolatilization. Time resolved kinetic studies on a bituminous coal at 0.1 Torr and 0.22 MPa are presented to illustrate the operation of the device. DOE

N82-29397# Strasbourg Univ. (France). Centre de Recherches Nucleaires.

ARGON LUMINESCENCE BANDS BETWEEN 1600 A AND 2900 A

G. Klein and M. J. Carvalho 1980 19 p refs
(DE81-700817; CRN-CPR-80-17) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

It is proposed that the luminescence bands observed in high pressure argon between 1600 A and 2900 A are due to transitions involving excited states, Ar2( ), of the molecular ion, Ar2( ): the initial state is a bound state having a (2)S-(2)S0 ion-atom asymptote and the final states two of the first set of molecular ion states which dissociate to the ion-atom pair (2)P-(1)S0. This assumption accounts for most known experimental data on this emission bands. The competition between the radiative transitions and the quenching collisions between the excited-ions and electrons in (-) particle tracks has been studied experimentally and is discussed in terms of the present hypothesis. A comparison is also made between the neutralization of excited and ground state molecular ions. DOE

N82-29398# Illinois Inst. of Tech., Chicago. Dept. of Chemistry.

STUDIES OF COMBUSTION KINETICS AND MECHANISMS Progress Report

D. Gutman 1 Dec. 1981 22 p
(Contract DE-AC02-78ER-14953)
(DE82-005329; DOE/ER-14953/2) Avail: NTIS HC A02/MF A01

The elementary reactions of polyatomic free radicals, and their reactions which are important in combustion processes are studied. The facility was designed and built, and used for studies of the reactions of three free radicals: C3H5, CH3, and CH3CO. A method was developed to generate polyatomic free radicals under controlled conditions which uses a pulsed CO2-TEA laser to decompose suitable radical precursors in a tubular reactor. Their chemical reactions are monitored using a photoionization mass spectrometer capable of recording the time evolution of either reactants or products. The special performance features which were sought in this facility are: (1) homogeneous generation of the labile intermediates in the reactor during a period which is short < 1 micron sec compared to the halflife of subsequent reactions < 5 msec; (2) sensitive, selective, and quantitative detection of labile and stable species participating in the reaction of interest; (3) good temporal resolution of species monitored during and experiment; and (4) capability of determining absolute concentrations of labile intermediates produced by the initial photolysis process. DOE

N82-29399# Oak Ridge National Lab., Tenn.

AQUEOUS CHEMISTRY OF CHLORINE: CHEMISTRY, ANALYSIS, AND ENVIRONMENTAL FATE OF REACTIVE OXIDANT SPECIES

R. L. Jolley and J. H. Carpenter Jan. 1982 123 p refs
(Contract W-7405-eng-26)
(DE82-007501; ORNL/TM-7788) Avail: NTIS HC A06/MF A01

The chemistry of chlorine relative to its reactions in fresh, estuarine, and marine waters and the formation of reactive oxidant species is reviewed. The current status of chemical analysis of reactive chlorine species and chlorine produced oxidant species relative to analysis of low concentrations (microgram-per-liter range) and accuracy and precision of methods are determined. The environmental fate of chlorine and chlorine produced oxidant species is examined. DOE

N82-29400# Joint Inst. for Nuclear Research, Dubna (USSR).

PROBLEM OF NEUTRON SPECTROSCOPY OF PARAMETRICALLY NONEQUILIBRIIUM QUASIPARTICLES IN SOLIDS. PART 1: NEUTRON INELASTIC SCATTERING ON POLARITONS IN THE PARAMETRIC RESONANCE CONDITIONS

Vo Hong Anh 1981 14 p refs
(DE82-700096; JINR-F-17-81-60) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

The parametric excitation of quasiparticle in solids by high-intensity electromagnetic radiation fields is considered as a method of solving the small concentration problem in neutron spectroscopy of such quasiparticles. Using a suitable quantum formalism for the calculation of correlation functions of anomalous fluctuations the analytical expressions for the cross sections of neutron inelastic scattering on polaritons in the parametric resonance conditions are obtained that show an anomalously large increase as the intensity of the driving laser field approaches the parametric excitation threshold. DOE

N82-29401# California Univ., Berkeley. Lawrence Berkeley Lab. Div. of Materials and Molecular Research.

HYDROCARBON CATALYSIS OVER PLATINUM SINGLE CRYSTAL SURFACES: THE ROLE OF ADSORBED CARBON DEPOSITS AND OTHER CHEMICAL ADDITIVES Ph.D. Thesis

Stephen Mark Davis Oct. 1981 512 p refs
(Contract W-7405-eng-48)
(DE82-010296; LBL-13051) Avail: NTIS HC A22/MF A01

The role of strongly adsorbed hydrocarbon deposits in reforming catalysis over platinum single crystal surfaces at atmospheric pressure and temperatures between 300 and 7000 K was established and a model developed for the working structure and composition of the active catalyst surface. For this purpose a sensitive counting system for carbon-14 radiotracer studies was developed and utilized to investigate the kinetics of hydrocarbon rehydrogenation and intermolecular hydrogen transfer reactions. Quantitative hydrogen thermal desorption methods were developed to determine the composition of adsorbed hydrocarbon species and the energetics of elementary, sequential C-H bond breaking processes. Carbon-monoxide adsorption-thermal desorption studies were used to titrate uncovered platinum surface sites before and after reaction rate studies. The dynamics of the metal-hydrocarbon interaction, including minimum surface residence times for dissociatively chemisorbed intermediates (10(+2) - 10(+1) sec) were revealed from simultaneous studies of the reaction kinetics for hydrocarbon-deuterium exchange and skeletal rearrangement. DOE

N82-29402# California Univ., Livermore. Lawrence Livermore Lab.

SOLVENT EXTRACTION OF METHANE FROM SIMULATED GEOPRESSURED-GEOTHERMAL FLUIDS: SUB-PILOT TEST RESULTS

Roland Quong, Henry H. OTsuki, and Frank E. Locke 14 Jan. 1982 28 p refs
(Contract W-7405-eng-48)
(DE82-010992; UCID-19291) Avail: NTIS HC A03/MF A01

The extraction of methane dissolved in 15 wt % sodium solution at 1500 C and 1000 psi was demonstrated using n-hexadecane as the solvent in a sub-pilot scale extraction column operated in a continuous, countercurrent flow mode. Greater than 90% recovery of methane was obtained with solvent/brine mass flow ratios in the range of .040 to .045. The height of an ideal stage in this experimental Elgin-type spray column was estimated to be 1.5 ft. Application of this process on actual geopressured fluids is technically feasible, and when combined with direct drive injection disposal is economically attractive. Design and operation of a methane saturated-brine supply system to provide simulated geopressured fluid continuously at 1500 C and 1000 psi are also described. Author

N82-29403# Pontificia Universidade Catolica do Rio de Janeiro (Brazil). Dept. de Fisica.

TRANSFER MATRIX TREATMENT FOR LINEAR CHAINS WITH LONG RANGE INTERACTIONS

Belita Koiller and H. S. Brandi Aug. 1980 15 p refs
(DE82-700102; PUC-tn-17/80) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

The transfer matrix technique is extended to determine the Green's function for 1-d systems with long range interactions. The formalism is applied to study the density of states and impurity modes of linear chains; calculations are presented for nearest and next nearest neighbors interactions. DOE

N82-29404# Oak Ridge National Lab., Tenn. Environmental Sciences Div.

FUELS AND CHEMICALS FROM WOODY BIOMASS PROGRAM Quarterly Progress Report for period ending 31 Dec. 1980

J. H. Cushman and J. W. Ranney Jan. 1982 105 p refs
(Contract W-7405-eng-26)

(DE82-010338; ORNL/TM-7952; ORNL-ESD-1827) Avail: NTIS HC A06/MF A01

Progress reports from twenty-two continuing research projects in the program are presented. The projects are in the following major areas: species screening and genetic selection; stand establishment and cultural treatment; and harvest, collection, transportation and storage. DOE

N82-29405# Institute of Gas Technology, Chicago, Ill.
HYDROPROCESSING OF HEAVY OILS Final Technical Report, 4 Sep. 1979 - 3 Nov. 1980
Ronald M. Bowman, Bassam J. Jody, George Jarvi, and Robert F. Zabransky Nov. 1981 66 p
(Contract DE-AC03-79SF-10760)
(DE82-011289; DOE/SF-10760/6) Avail: NTIS HC A04/MF A01

Hydroprocessing of No. 4 fuel oil to produce a steam-reforming feed suitable for an integrated fuel cell power generation facility was studied. The program included both a system analysis and experimental hydroprocessing work. The initial phase of the experimental work was designed to determine the feasibility of converting the feed to a product suitable for a conventional steam reformer in a single-stage operation. Three catalysts were tested: American Cyanamid AERO HDS-20A, Shell 324, and a proprietary Union Carbide hydrocracking catalyst. Sustained operation with a significant amount of conversion could not be achieved in this mode of operation with these catalysts. The second phase of the experimental work was designed to investigated a two-stage operation in which the feed was first hydrotreated and then hydrocracked. Shell 324 was used as the hydrotreating catalyst; the Union Carbide catalyst was used in the hydrocracking stage. The results of this study indicate that work on developing a low-pressure (less than 500 psig) hydrocracking catalyst that is sulfur- and nitrogen-resistant should be considered. DOE

N82-29406# Oak Ridge National Lab., Tenn. Energy Div.
SOLVENT REFINED COAL DEMONSTRATION PROJECTS: NEPA PROBLEMS AND RESOLUTIONS
Steven G. DeCicco Feb. 1982 70 p refs
(Contract W-7405-eng-26)
(DE82-008104; ORNL/TM-8165) Avail: NTIS HC A04/MF A01

The background to preparation of the Final Environmental Impact Statements (EIS) for the two proposed solvent refined coal demonstration projects (SRC-I and SRC-II) is presented. These EISs were prepared in a climate of political, technological, and environmental uncertainties. The problems that arose during the EIS preparation tended to fall into three categories: policy, technical, and institutional. The experience gained in uncovering and solving the major problems are presented. Recommendations for those facing EISs on synfuel or similarly controversial technologies are presented. DOE

N82-29407# Chicago Univ., Ill.
COAL-TRANSFORMATION CHEMISTRY Quarterly Progress Report
Leon M. Stock 1981 45 p refs
(Contract DE-AC22-80PC-30088)
(DE82-010100; DOE/PC-30088/7; QPR-7) Avail: NTIS HC A03/MF A01

Illinois No. 6 coal was benzylated selectively on phenolic and carboxylic groups using tetrabutylammonium hydroxide as a base and phase transfer catalyst and benzylbromide as the benzylating agent. Demineralized Illinois No. 6 coal was O-methylated in a similar fashion. Colorado coal was reductively methylated and subsequently methylated using tetrabutylammonium hydroxide. The spectroscopic data for these reactions are presented and interesting features are discussed. Illinois No. 6 coal was reductively ethylated using the Sternberg procedure. Analysis of the carbon NMR of the tetrahydrofuran soluble coal product gives some insight into the nature of carbon-carbon alkylation. Illinois No. 6 coal was trifluorcacetoxylated with lead (IV) ttrakistri fluoroacetate in trifluoroacetic acid at ambient temperature. Trifluoroacetoxylated coal was hydrolyzed in aqueous medium to give hydroxylated coal. The introduction of hydroxyl groups was confirmed by infrared spectroscopy. Several reactions of this hydroxylated coal were investigated. Tin (IV) chloride was selected to study the influence of Lewis acids on the deuterium hydrogen exchange reactions of diphenylmethane and tetralin-d12 or maphthalene-d8 at low temperature (3000 C and 2000 C). The effort on donor solvent coal chemistry was directed to investigate the role of pericyclic reactions in the liquefaction process more extensively. Preliminary results indicate that free radical processes occur preferentially and that pericyclic reactions are unimportant at the threshold reaction temperatures of 400 to 4250 C. DOE

N82-29408# California Univ., Livermore. Lawrence Livermore Lab.
COMPUTER AUTOMATION FOR CHEMISTRY INSTRUMENTS Final Report, 1 Feb. 1980 - 31 Jan. 1981
Thomas A. Brubaker 7 Apr. 1981 126 p refs
(Contract W-7405-eng-48)
(DE82-006857; UCRL-15424) Avail: NTIS HC A07/MF A01

The work performed on computer automation of chemistry instruments consisted of the following: (1) development of computer aided design software for polynomial filters and Butterworth-Chebychev filter design; (2) development of algorithms for resolving peaks in spectroscopic data; and (3) interaction with LLL personnel to develop a structure for automation of surface chemistry spectroscopy. Each work phase is discussed in detail. DOE

N82-29409# Texas Univ., Austin. Dept. of Physics.
POLAR FLUIDS: PHOTOEMISSION AND ELECTRONIC ENERGY LEVELS
James C. Thompson and Peter R. Antoniewicz 1 Dec. 1981 17 p refs
(Contract DE-AS02-81ER-10890)
(DE82-006796; DOE/ER-10890/1-2) Avail: NTIS HC A02/MF A01

The proposed experiments consist of the measurement of photoemission currents into polar liquids, especially NH3. A pulsed Molecron UV14 nitrogen laser is used to pump a Molecron DL14 dye laser with a frequency doubler. The laser pulse will be used to eject photoelectrons from a silver photocathode immersed in liquid NH3. The liquid also contains a working and a reference electrode. Two sorts of measurements are planned. In one, the magnitude of the current pulse is to be measured as a function of bias voltage at fixed photon energy. In the other, the bias will be held and the laser frequency varied. DOE

N82-29410# California Univ., Berkeley. Lawrence Berkeley Lab.
EFFECTS OF OXYGEN ON THE MICROSTRUCTURE OF Cu SUB 2-x/S THIN FILMS
T. D. Sands Nov. 1981 63 p refs
(Contract W-7405-eng-48)
(DE82-007617; LBL-13659) Avail: NTIS HC A04/MF A01

Changes in the microstructure of Cu sub 2-x S thin films after heat treatment in air at 1800 C were monitored by high resolution transmission electron microscopy (TEM). Specimens were prepared by the aqueous exchange of copper and cadmium in the surface layers of pre-thinned CdS single crystals, simulating the copper sulfide layer in Cu sub 2-x S/CdS solar cells without the complicating influence of CdS grain boundaries. Results indicate that the oxidation of copper and the oxidation of sulfur are competing processes which depend on the temperature range of the heat treatment. A kinetic model explaining this behavior is proposed, wherein the effects of the activation barrier opposing the hexagonal chalcocite to cubic digenite transformation are recognized. A sequence of superstructure images indicating a net sulfur loss in Cu sub 2-x S during heat treatment is presented in support of this model. Furthermore, observations of the Cu sub 2-x S microstructure reveal that chalcocite/djurleite interfaces are abrupt to within 20A. The structural relationships between these two phases are examined in detail, and a possible transformation mechanism involving the clustering of copper vacancies is presented. DOE

N82-29411# Permutit Co., Inc., Paramus, N.J.
NON-ACID PRETREATMENT AND MANAGEMENT OF MICROORGANISMS IN SEAWATER DESALINATION BY REVERSE OSMOSIS
A. B. Mindler 12 Nov. 1981 99 p refs

(Contract DI-14-34-0001-0466)
(PB82-153396; W82-02108; OWRT-C-00093-D(0466)(1))
Avail: NTIS HC A05/MF A01 CSCL 07D

Non-acid pretreatment was studied in a seawater reverse osmosis pilot plant for one year with particular attention to biological aspects. Pretreatment of the tropical surface seawater by in-line coagulation/filtration reduced the Silt Density Index (SDI) consistently below 3.0 in the polishing filter effluent. Subsequent biological activity of periphytic organisms on piping surfaces after addition of organic antiscalants increased SDI by one unit or more. Slough-off of the organisms' polysaccharide sheaths resulted in fouling of the hollow fiber permeators. Both polyacrylate and tannin antiscalants were found to serve as nutrient for bacterial growth and both impaired RO performance. Tannin uniquely decreased the attachment ability of periphytic bacteria. No hard scale was found during autopsy, but a small amount of amorphous calcium salt was detected in potted fiber ends of the permeators and in piggy-back spiral wound elements. Analyses of foulants are reported. GRA

N82-29412# National Bureau of Standards, Washington, D.C.
A PROGRAMMABLE SAMPLE DRYER FOR THERMAL IONIZATION MASS SPECTROMETRY Final Report
John W. Gramlich and Ronald W. Shideler Jan. 1982 22 p refs
(PB82-158783; NBS-TN-1154) Avail: NTIS HC A02/MF A01 CSCL 14B

A dryer was designed which allows reproducible and automatic filament current and timing adjustments for up to five separate steps. Designed around inexpensive TTL logic, the dryer may be programmed by resistors on a plug-in card to provide the proper drying conditions, be programmed to stop and signal the operator after any step, or be allowed to continue uninterrupted through the entire drying sequence. A programmable 110 volt output is provided for controlling a heat lamp or other accessory. GRA

N82-29413# National Inst. for Metallurgy, Randburg (South Africa). Analytical Chemistry Div.
THE SEPARATION OF TRACE ELEMENTS IN MANGANESE DIOXIDE
E. A. Jones and K. Dixon 30 Oct. 1981 28 p refs
(PB82-157066; NIM-2131; ISBN-0-86999-558-8) Avail: NTIS HC A03/MF A01 CSCL 07D

Separations from manganese are described for: (1) Al(III), Mo(VI), V(v), and Ti(IV), and (2) trace elements in general. In the first separation, a combined anioncation exchange, the oxalate complexes are adsorbed onto the anionic BIO.RAD 1-X8 resin. V(V) and Al(III) are then eluted into a cation-exchange column from which they are eluted successively, Mo(VI) and Ti(IV) then being eluted from the anionic resin. In the second separation, up to 2g of manganese is adsorbed onto BIO.RAD AG 50W-X8 resin, from which V(V) is eluted with dilute hydrochloric acid prior to the elution of Co(II), Cu(II), Zn(II), Cd(II), Fe(III), As(III), Sb(III), Mo(VI), W(VI), and Sn(II) with a mixture of 1M hydrochloric acid, 80 percent acetone, and 0.1 percent hydrogen peroxide. Mn(II) is eluted next with a mixture of 0.75M hydrochloric acid and 90 percent acetone, after which the remaining cations are eluted with 4M hydrochloric acid. Satisfactory recoveries ranging from 0.8 to 60 mg were obtained for 18 of the 21 elements tested. After concentration by evaporation, final measurements were made by the use of atomic-absorption spectrophotometry, or direct-reading spectrometry with excitation from an inductively coupled plasma source. GRA

N82-29414# National Bureau of Standards, Washington, D.C.
CHARACTERIZATION OF ORGANOMETALLIC POLYMERS BY CHROMATOGRAPHIC METHODS AND NUCLEAR MAGNETIC RESONANCE
E. J. Parks, R. B. Johannesen, and F. E. Brinckman Dec. 1981 41 p refs Sponsored by Navy
(PB82-151465; NBSIR-81-2424) Avail: NTIS HC A03/MF A01 CSCL 07D

Organometallic polymer (OMP) marine surface antifouling agents were characterized by size exclusion chromatography (SEC) coupled with tin-specific graphite furnace atomic absorption spectroscopy (GFAA) as well as by Fourier transform nuclear magnetic resonance (FT-NMR). The key molecular parameters of many OMPs, the kinetics of formation of a typical copolymer, and the effects of different concentrations of free radical initiators on the formation of a copolymer in a well-stirred reaction system were characterized by means of SEC-GFAA chromatograms. The FT-NMR spectra of ^{119}Sn give kinetic information in good agreement with that obtained by SEC-GFAA. Both chemical shift and linewidth of the tin NMR signal have an unusually large solvent and temperature dependence. Directions for future research on OMPs are discussed. GRA

N82-30223 Atlantic Research Corp., Alexandria, Va.
PROPELLANT BURNING CALCULATIONS
M. K. King *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 99-114 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

N82-30224 Atlantic Research Corp., Alexandria, Va.
METAL COMBUSTION EFFICIENCY
M. K. King *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting minutes Mar. 1982 p 115-134 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

N82-30230 Hercules, Inc., McGregor, Tex.
WORKSHOP REPORT: BURN RATE DETERMINATION METHODOLOGY
W. T. Brooks *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 247-253 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

N82-30231 Hercules, Inc., McGregor, Tex.
JANNAF WORKSHOP ON BURN RATE DETERMINATION METHODOLOGY
W. T. Brooks *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 255-267 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

N82-30232 Hercules, Inc., McGregor, Tex.
WORKSHOP REPORT: BURN RATE DETERMINATION METHODOLOGY (PAPER)
W. T. Brooks *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 269-278 ref (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N82-29415* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REFRACTORY COATINGS AND METHOD OF PRODUCING THE SAME Patent
William A. Brainard and Donald R. Wheeler, inventors (to NASA) Issued 22 Jun. 1982 4 p Filed 7 Dec. 1979 Supersedes N80-14232 (18 - 05, p 0583)
(NASA-Case-LEW-13169-1; US-Patent-4,336,117; US-Patent-Appl-SN-102003; US-Patent-Class-204-192C) Avail: US Patent and Trademark Office CSCL 11F

The adhesion, friction, and wear properties of sputtered refractory coatings on substrates of materials that form stable nitrides is improved by placing each substrate directly below a titanium carbide target of a commercial radiofrequency diode apparatus in a vacuum chamber. Nitrogen is bled into the system through a nozzle resulting in a small partial pressure of about 0.5% to 2.5% during the first two minutes of deposition. The flow of nitrogen is then stopped, and the sputtering ambient is reduced to pure argon through a nozzle without interrupting the sputtering process. When nitrogen is deliberately introduced during the crucial interface formation, some of the titanium at the interface reacts to form titanium nitride while the metal of the substrate also forms the nitride. These two nitrides atomically mixed together in the interfacial region act to more strongly bond the growing

titanium carbide coating as it forms on the substrate.
Official Gazette of the U.S. Patent and Trademark Office

N82-29416 British Library Lending Div., Boston Spa (England).
INDUCED PRECIPITATION AND SWELLING IN AN UNDERSATURATED Ni 6 AT PERCENT Ge SOLID SOLUTION IRRADIATED WITH 1 MeV
A. Barbu 23 Jun. 1982 15 p refs Transl. into ENGLISH of paper presented at the Intern. Conf. on Irradiation Behaviour of Metal Mater. for Fast Reactor Core Components, 1979 Conf. held at Ajaccio, Corsica, 5-8 Jun. 1979 Submitted for publication
(BLL-Risley-Tr-4123-(9091.9F); Paper-B9) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

Although the size effect of germanium in nickel is positive, radiation induced precipitation does take place in the NiGe solid solution. A model of segregation towards sinks caused by the entrainment of solute by point defects is discussed. This alloy swells very rapidly and the cavities observed are covered with precipitates. S.L.

N82-29417 British Library Lending Div., Boston Spa (England).
CONTRIBUTION OF SIMULATION TECHNIQUES TO THE STUDY OF SWELLING IN AUSTENITIC STEELS
N. Azam, J. Delaplace, and L. LeNadur 23 Jun. 1982 16 p refs Transl. into ENGLISH of paper presented at the Intern. Conf. on the Irradiation Behaviour of Metal Mater. for Fast Reactor Components, 1979 Conf. held in Ajaccio, Corsica, 4-8 Jun. 1979
(BLL-Risley-Tr-4125-(9091.9F); Paper-D8) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The effects of irradiation in type 316 austenitic steels were studied. The specific subjects studied were: (1) the dislocation density curve under irradiation; (2) the part played by existing dislocations and the influence of certain additives on swelling; (3) the swelling of a type 316 steel with a high carbon content; and (4) the effect on swelling of pressure changes during irradiation. B.W.

N82-29418 British Library Lending Div., Boston Spa (England).
STABILITY OF ALLOYS UNDER IRRADIATION
G. Martin, R. Cauvin, J. L. Bocquet, and A. Barbu 23 Jun. 1982 19 p refs Transl. into ENGLISH of paper presented at the Intern. Conf. on the Irradiation Behavour of Metal. Mater. for Reactor Core Components, 1979 Conf. held in Ajaccio, Corsica, 5-8 Jun. 1979 Submitted for publication
(BLL-Risley-Tr-4124-(9091.9F); Paper-B11) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

In irradiated solid solutions the solubility limit is a function of the instantaneous irradiation flux. The experimental facts, microscopic theories and atomic mechanisms are reviewed. The overlapping of precipitation and swelling is briefly discussed. B.W.

N82-29419 British Library Lending Div., Boston Spa (England).
REVIEW OF PICKLING OF METALS BY A. M. YAMPOLSKII
D. L. Grinberg and V.M. Fainshtein 5 Jul. 1982 6 p Transl. into ENGLISH from Stal (USSR), v. 4, 1981 p 61-62
(BLLD-M-26552-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The pickling of certain types of steel, copper, and aluminum and their alloys, and a series of other nonferrous, noble and rare metals are considered. Processes of electrochemical pickling, electropolishing, chemical milling, etc., are examined. A number of compositions for chemical branding, marking, and engraving, for pickling pastes, and for rust transformers are presented. S.L.

N82-29420 British Library Lending Div., Boston Spa (England).
ESTIMATION OF STAMPABILITY OF COLD ROLLED, LOW CARBON STEEL SHEET
A. L. Khotomlyanskii and D. I. Yaroslavskii 5 Jul. 1982 8 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii Chernaya Met. (Moscow), v. 4, 1981 p 139-143
(BLLD-M-26570-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

A method is proposed for estimating individual quality properties and stampability in its entirity. The method can be used for making reliable deductions regarding the quality of a steel, and as a criterion of the effectiveness of any measures aimed at improving the quality of the stamping technology. The resultant estimations can be used in mechanical engineering works in the selection of suitable products for the stamping of parts of various complexities. Author

N82-29421 British Library Lending Div., Boston Spa (England).
EFFECT OF PROCESSING PARAMETERS ON THE MODIFICATION AND DEMODIFICATION OF STEEL BY TITANIUM NITRIDE
I. V. Gavrilin 5 Jul. 1982 8 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii Chernaya Met. (USSR), v. 4, 1981 p 114-118
(BLLD-M-26567-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

Loss of the inoculation effect when modifying steel with titanium nitride is greater the higher the temperature of the steel, and the longer the steel is held in the molten state after inoculation. Of the factors causing such losses, oxidation of the titanium in the titanium nitride by oxygen entering the melt from the atmosphere plays a particularly important part. Two stages can be discerned in the demodification process, each with a different mechanism, depending on the amount of oxygen in the steel. Author

N82-29422 British Library Lending Div., Boston Spa (England).
RELATIONSHIP BETWEEN PHASE DIAGRAM AND NATURE OF INFLUENCE OF ELEMENTS ON PROPERTIES
B. B. Gulyaev, V. N. Nosov, N. G. Girshovich, and G. A. Kosnikov 5 Jul. 1982 7 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii Chernaya Met. (USSR), v. 4, 1981 p 106-110
(BLLD-M-26566-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The influence of the presence of various elements on the structure and properties of iron alloys, particularly iron carbon alloys, is analyzed. The analysis permits the development and application of element complexes with predetermined properties. J.D.

N82-29423 British Library Lending Div., Boston Spa (England).
THE FORMATION OF NON-METALLIC INCLUSIONS WITH VARYING COMPOSITIONS IN STEEL AS IT SOLIDIFIES
V. A. Petrovskii, A. E. Volkov, and V. T. Borisov 5 Jul. 1982 8 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii Chernaya Met. (USSR), v. 4, 1981 p 49-52
(BLLD-M-26560-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

A theory was developed for the formation of variable composition nonmetallic inclusions in the two phase zone in solidifying ingots. Theoretical results have been found to agree well with those of experiments; the conditions under which nitride inclusions form in steels were analyzed. B.W.

N82-29424*# Advanced Research and Applications Corp., Sunnyvale, Calif.
THE RELATIVE STRESS-CORROSION-CRACKING SUSCEPTIBILITY OF CANDIDATE ALUMINUM-LITHIUM ALLOYS FOR AEROSPACE APPLICATIONS Final Report
Patrick P. Pizzo Washington NASA Jun. 1982 128 p refs (Contract NAS2-10365)
(NASA-CR-3578; NAS 1.26:3578; TR-45-2) Avail: NTIS HC A07/MF A01 CSCL 11F

Stress corrosion tests of Al-Li-Cu powder metallurgy alloys are described. Alloys investigated were Al-2.6% Li-1.4% and Al-2.6% Li-1.4% Cu-1.6% Mg. The base properties of the alloys were characterized. Process, heat treatment, and size/orientational effects on the tensile and fracture behavior were investigated. Metallurgical and electrochemical conditions are identified which provide reproducible and controlled parameters for stress corrosion evaluation. Preliminary stress corrosion test results are reported. Both Al-Li-Cu alloys appear more susceptible to stress corrosion crack initiation than 7075-T6 aluminum, with the magnesium bearing alloy being the most susceptible. Tests to determine the threshold stress intensity for the base and magnesium bearing alloys are underway. Twelve each, bolt loaded DCB type specimens are under test (120 days) and limited crack

growth in these precracked specimens has been observed. General corrosion in the aqueous sodium chloride environment is thought to be obscuring results through crack tip blunting. J.D.

N82-29425# Columbia Univ., New York. School of Mines.
THE EFFECTS OF SMALL DEFORMATION ON CREEP AND STRESS RUPTURE OF ODS SUPERALLOYS Annual Progress Report, 1 Jun. 1980 - 30 Sep. 1981
Timothy E. Howson, Vincent Nardone, and John K. Tien 12 Mar. 1982 24 p refs
(AF Proj. 2306)
(AD-A113898; AFOSR-82-0305TR) Avail: NTIS HC A02/MF A01 CSCL 11/6

This research program aims to enhance understanding of the effects of predeformation on the creep and stress rupture of oxide dispersion strengthened (ODS) alloys and also of the cyclic creep and cyclic stress rupture behavior of ODS alloys. During the third program year, the research effort was focused on the 760 C cyclic creep behavior of MA 6000E, an advanced ODS superalloy that is strengthened by a unique combination of upsilo prime precipitates and oxide dispersoids for both intermediate and elevated temperature strength. Cycling the load at 760 C resulted in a dramatic decrease in the minimum strain rate and an increase in the rupture life relative to the static case (no load cycling). The magnitude of the effect increased as the cyclic period decreased--there is an order of magnitude decreased in the minimum creep rate in going from a static test to a cyclic period of ten minutes. The creep deceleration involves storage and recovery of anelastic strain, and this mechanism is discussed and modeled. Comparisons of the cyclic creep properties of ODS alloys and conventional superalloys show that the effects of reduced minimum creep rate and extended rupture life due to cyclic loading during creep are more significant and pronounced in ODS alloys than in other alloys and superalloys that are not dispersion strengthened. GRA

N82-29426# Battelle Columbus Labs., Ohio.
SHEAR BANDS IN FORGED PRODUCTS Final Technical Report, 1979 - 1982
S. L. Semiatin, G. D. Lahoti, S. I. Oh, A. L. Hoffmanner, and T. Altan 15 Mar. 1982 68 p refs
(Grant AF-AFOSR-0048-79; AF Proj. 2306)
(AD-A114793; AFOSR-82-0392TR) Avail: NTIS HC A04/MF A01 CSCL 11/6

Shear bands, intense bands of localized deformation, are a primary source of defective forgings and their occurrence is a significant factor limiting the precision attainable by forging. The occurrence and effects of shear bands are not well understood. There is no test for predicting their occurrence and, therefore, they are averted by the inefficient and costly use of oversize forgings and in-process die reworking. The overall objective of this program is to document the occurrence of shear bands in forged products produced under well defined conditions, develop analytical techniques for their prediction, and evaluate their effects on structural performance. GRA

N82-29427# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
MEASUREMENT OF MATERIAL PROPERTIES FOR HIGH RATE DEFORMATION PROCESSES Interim Report, 1 Jun. - 1 Nov. 1981
Ted Nicholas Feb. 1982 27 p refs
(Contract AFWAL-TR-81-4176; AF Proj. 2307)
(AD-A114681; AFWAL-TR-81-4176) Avail: NTIS HC A03/MF A01 CSCL 11/6

As higher and higher strain rates are achieved in experiments, the deformation field varies from one which is nearly homogeneous to the case where high amplitude stress waves or shock waves are propagating. In order to analyze a high rate experiment, a sound mathematical theory of wave propagation is required. This, in turn, requires a description of the material behavior. But it is this description of material behavior which is being sought in the first place. It is this dilemma which has caused problems in deducing the dynamic properties of materials at very high strain rates. Techniques available for determining the high rate properties of materials are reviewed. These range from split Hopkinson bar, in which a uniaxial stress state is assumed, to the flat plate impact experiment where waves of uniaxial strain occur. Other configurations include expanding rings and cylinders and skew plate impacts. These various techniques are discussed with respect to their fundamental limitations and the type of material property data which can be obtained. Author (GRA)

N82-29428# Massachusetts Inst. of Tech., Cambridge.
FCC AND BCC SOLIDIFICATION PRODUCTS IN A RAPIDLY SOLIDIFIED AUSTENITIC STEEL Technical Report, Oct. 1980 - Sep. 1981
Thomas F. Kelly, John E. VanderSande, and Morris Cohen 1 Dec. 1981 8 p refs
(Contract N00014-81-K-0013)
(AD-A114716; TR-3) Avail: NTIS HC A02/MF A01 CSCL 11/6

The microstructures and local composition variations in centrifugally atomized high-sulfur stainless steel powder are investigated. Both fcc and bcc are found to be primary solidification phases in the as-solidified powder of this nominally austenitic steel where the smaller powder particles (approx. < 70 micron diameter) tend to be bcc. Cellular solidification structures, with sulfide precipitates (100 to 200 nm diameter in size) at the cell walls, are observed in both fcc and bcc particles. The bcc structure, however, has many small sulfide precipitates (10 to 20 nm diameter) in the cell interior with few larger sulfide precipitates at the cell walls. The small precipitates, observed only in the bcc structures, form on cooling from a supersaturated solid solution that results from reduced solute partitioning during solidification. partitioning of chromium and nickel is minimal in these cellular structures. A non-cellular bcc structure is also observed with small sulfide precipitates throughout the entire structure. This non-cellular bcc structure results from smooth-front massive solidification. Analysis of the nucleation process for solidification indicates that a transition from fcc nucleation to bcc nucleation occurs with increasing wetting angle in heterogeneous nucleation. Thus bcc should nucleate in the smaller droplets of a liquid dispersion where catalytic surfaces of low potency (large wetting angle) tend to be the only heterogeneous nucleants available. Author (GRA)

N82-29429# Massachusetts Inst. of Tech., Cambridge.
ANALYSIS OF A RAPIDLY SOLIDIFIED HIGH PHOSPHORUS AUSTENITIC STEEL CONTAINING AN AMORPHOUS PHASE Technical Report, Oct. 1980 - Sep. 1981
T. F. Kelly, G. B. Olson, and J. B. VanderSande 1 Dec. 1981 6 p refs
(Contract N00014-81-K-0013)
(AD-A114715; TR-2) Avail: NTIS HC A02/MF A01 CSCL 11/6

Rapid solidification of a high-phosphorus austenitic steel produces a fine cellular solidification structure containing an amorphous phase at the cell walls. The amorphous phase, which is stable to approx. 500 C, is enriched in phosphorus and chromium, but contains significantly less phosphorus than conventional glass-forming alloys. Hot consolidation of powders produces a chemically-uniform metastable austenite which can be effectively precipitation hardened by phospho-carbides. Author (GRA)

N82-29430# Southern Univ., Baton Rouge, La. Dept. of Mechanical Engineering.
AN INVESTIGATION OF MECHANISMS EFFECTING ENVIRONMENTAL STRESS CRACKING IN TITANIUM ALLOY
Ira J. Graham 6 Jul. 1981 34 p refs
(Contract N00019-80-C-0421)
(AD-A114660) Avail: NTIS HC A03/MF A01 CSCL 11/6

A heat treated version of titanium alloy (Ti6Al4V) has been under an environmental stress cracking investigation. The acoustic emission (AE) techniques were used to monitor crack growth in a 1 inch thick WOL bolt loaded compact tension test specimen under a linear compliance load to provide plane strain fracture over the environment test duration. An acoustic emission transducer (S-140B) was used to detect the crack movement in the test specimen while it was submerged in a closed loop methanol environment. The acoustic signals were received at a gain of 85 dB in a high bandpass filter range of 100-300 KHz and displayed in the totalizer window as digital output data, (BCD). The signals were then passed into the D/A converter

and recorded as analog data on the x-y plotter. Two significant results were revealed by the AE technique, (1) heat treating just below the beta transformation temperature and annealing for a select time improved the fracture toughness in the alloy, and (2) in a plane strain load mode at a constant crack-opened-displacement (COD), the titanium alloy was crack sensitive in a pure methanol environment and not crack sensitive in the laboratory atmosphere environment. The acoustic emission rate, hence crack growth rate, appears to be a function of the methanol concentration, thus related to a diffusion mechanism. GRA

N82-29431# American Univ., Washington, D. C. Dept. of Chemistry.
THE CHEMICAL NATURE OF ALUMINUM CORROSION. 2: THE INITIAL DISSOLUTION STEP Technical Progress Report
T. H. Nguyen and R. T. Foley Mar. 1982 8 p refs
(Contract N00014-75-C-0799; NR Proj. 036-106)
(AD-A114609; TR-15) Avail: NTIS HC A02/MF A01 CSCL 11/6

The dissolution reaction at a bare aluminum surface in different aqueous solutions was investigated with the scrape potential technique. The rate equations for different processes were derived from the relaxation kinetic devised by Eigen. These rate constants approximate the rates of formation of iron halide and aluminum complexes reported in the literature. A reaction scheme for the metal dissolution process was proposed and it is concluded that the controlling step is the complexation reaction of the hydrated cation with the anion present. Author

N82-29432# Connecticut Univ., Storrs. Dept. of Metallurgy.
THE FATIGUE OF POWDER METALLURGY ALLOYS Annual Scientific Report, 1 Dec. 1980 - 30 Nov. 1981
A. J. McEvily, Jr. 8 Jan. 1982 24 p refs
(Grant AR-AFOSR-0046-81; AF Proj. 2306)
(AD-A114773; AFOSR-82-0216TR) Avail: NTIS HC A02/MF A01 CSCL 11/6

Fatigue crack growth in the powder metallurgy alloys X7090-T6 and X7091-T7E69 has been studied at two R ratios (0.05 and 0.5) in air. Additional tests in a 3-1/2% NaCl environment have also been made. Particular emphasis has been placed on the study of the crack closure process on the near-threshold region. Comparisons are made with the fatigue crack growth characteristics of an ingot metallurgy product, 7075-T76. In all alloys high closure levels are observed at R equal 0.05 in the near threshold region, an indication that Mode II is operative. At R equal 0.5 the closure effect is much less pronounced except at the threshold itself, an indication that Mode I is dominant. These indications of the operative crack growth modes are supported by fractographic examination. In the NaCl environment it was found that the threshold level is higher than in air of closure. Further, a unique relationship between the rate of crack growth and the range of the stress intensity factors was not observed as the result of corrosion product build-up behind the crack tip. Author (GRA)

N82-29433# Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
HYDROGEN ABSORPTION BY NIOBIUM
B. A. Coulman and H. K. Birnbaum 13 Apr. 1982 35 p refs
(Contract N00014-75-C-1012)
(AD-A114873) Avail: NTIS HC A03/MF A01 CSCL 11/6

The absorption of hydrogen into niobium was studied using UHV methods to control surface impurities and resistivity techniques to determine the amount of hydrogen in solid solution. Author (GRA)

N82-29434# Virginia Univ., Charlottesville. School of Engineering and Applied Science.
DIRECT STUDIES OF FRACTURE MECHANISMS IN METALS AT HIGHEST MAGNIFICATION Final Report, 1 Feb. 1969 - 28 Feb. 1982
H. G. F. Wilsdorf May 1982 68 p refs
(Contract N00014-75-C-0691)
(AD-A114712; UVA/525354/MS82/102) Avail: NTIS HC A04/MF A01 CSCL 11/6

Techniques for in situ straining to fracture were developed for use in high voltage and conventional transmission electron microscopes in order to record the dynamic features preceding crack initiation and the subsequent crack propagation in ductile metals. Eight pure metals and alloys were investigated. It was discovered that dislocation cell walls are the primary sites for microcrack initiation, even in alloys which contain soft second phase particles. Ligament fracture was found to occur by shear which, in low stacking fault metals, was by translation and twinning. The presence of micro-voids and cell wall remnants affected the zig-zag geometry of the crack flank. For macroscopic rupture and for cup and cone fracture the final separation took place by rupture processes in the microstructural regime. Author

N82-29435# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe und Heisse Zellen.
OPTIMIZATION OF PHASE ANALYSIS OF REFRACTORY ALLOYS IN THE GAS-ION-REACTION CHAMBER
H. J. Blumenkamp, H. Hoven, K. Koizlik, and H. Nickel Apr. 1980 67 p refs In GERMAN
(Juel-1654; ISSN-0366-0885) Avail: NTIS (US Sales Only) HC A04/MF A01; DOE Depository Libraries

Refractory alloys were investigated by metallography, which is an independent group of characterization procedures as well as basis for many other methods. Reactor components outside the core which are under high thermal and mechanical stresses are made from refractory alloys. The material yield by metallography is the expansions of phase contrast, in particular the phase contrasting in the gas-ion-reaction chamber. The experimental procedure is described and the optimization of the procedure with the Ni and Fe-based refractory alloys examined in the IRW is discussed. DOE

N82-29436# Colorado School of Mines, Golden.
FERROUS ALLOY METALLURGY: LIQUID-LITHIUM CORROSION AND WELDING Progress Report, 1 Jan. - 31 Dec. 1981
D. L. Olson and D. K. Matlock 1981 68 p refs
(Contracts EY-76-S-02-2313; DE-AS02-76ER-02313)
(DE82-005306; DOE/ER-02313/11; COO-2313-11) Avail: NTIS HC A04/MF A01

The frequency dependent fatigue-crack-propagation characteristics of 2 1/4 Cr-1 Mo steel and types 304 and 304L stainless steel show that liquid lithium enhances fatigue crack growth rates in the temperature range of 4730 K to 9730 K. A mechanistic interpretation of the effects of lithium indicates that lithium enhances crack growth by inducting embrittlement at low temperatures and by grain boundary penetration at high temperatures. The high temperature corrosion characteristics of 304L stainless steel in low nitrogen liquid lithium show that corrosion results in the two-stage development of a ferrite layer. The variables which influence the microstructural, mechanical and thermal expansion properties of dissimilar metal weldments are considered. T.M.

N82-29437# Ames Lab., Iowa. Dept. of Chemistry.
PREPARATION AND CHARACTERIZATION OF DIMERIC AND TETRAMERIC CLUSTERS OF MOLYBDENUM AND TUNGSTEN Ph.D. Thesis
Timothy Richard Ryan Oct. 1981 160 p refs
(Contract W-7405-eng-82)
(DE82-005456; IS-T-952) Avail: NTIS HC A08/MF A01

The cyclo-addition of two Mo2Cl4[P(C6H5)3]2(CH3OH)2 molecules produced a new type of tetrameric molybdenum cluster, Mo4Cl8L4. Structural characterization of this dimer revealed weak molybdenum-methanol bonding which was consistent with the observed reactivity of the compound. Synthetic methods were devised for the preparation of Mo4X8L4 clusters where X = Cl, Br, I and L = PR3, Po3, RCN, CH3OH. A scheme for the metal-metal bonding in these clusters was presented which was in agreement with the known structural features of Mo4Cl8(PR3)4, R = C2H5, n-C4H9. The preparation of the analogous W4Cl8 (PR3)4 cluster from WCl4 was accomplished by application of techniques used in the molybdenum syntheses. The single crystal X-ray structure revealed slight differences from the molybdenum analog which were rationalized in terms of the known behavior in dimeric tungsten and molybdenum species. The attempted preparation of a tetrameric tungsten cluster from W2(mhp)4 was unsuccessful (mhp = anion of 2-methyl-6-hydroxypyridine). DOE

N82-29438# Pratt and Whitney Aircraft Group, West Palm Beach, Fla.

INVESTIGATION OF VANADIUM AND HOT CORROSION RESISTANCE OF CHROMIUM AND SILICON BASE COATING SYSTEMS Semiannual Report for period 1 Apr. - 20 Sep. 1981

R. H. Barkalow and A. S. Khan Oct. 1981 12 p
(Contract DE-AC06-79ET-15322)
(DE82-004516; DOE/ET-15322/T4; FR-15488) Avail: NTIS HC A02/MF A01

Turbine coatings capable of resisting both hot corrosion and ash erosion effects due to vanadium, sulfur, and alkali metals in residual oils and the oxidation/interdiffusion degradation resulting from cleaner but hotter burning coal derived fuels were investigated. Since the former of these regimes appears inherently aggressive to thin alumina scales, coating development from alloys which depend for their environmental stability on scales other than alumina was attempted. The potential for improved durability of other scales is that chromia is thicker, while silica is believed to be essentially immune to acidic dissolution in molten salts. A program of furnace and burner rig testing was devised to evaluate the behavior of the following alloys in Na2SO4, V2O5, and mixed salt hot corrosion: (1) NiCrSi alloys of varying Cr and Si content, (2) quarternary and active element additions to NiCrSi, (3) Cr base alloys, and (4) Si-34Cr-23Ta. Fundamental information about the corrosion behavior of these alloys is being sought by determining material consumption and degradation microstructure versus the major hot corrosion variables (temperature, type and amount of salt, air versus SO3 and V2O5 in the gaseous environment). Progress is reported. DOE

N82-29439# Connecticut Univ., Storrs. Dept. of Mechanical Engineering.

INVESTIGATION OF ROLE OF SUBSURFACE ZONES IN WEAR OF MATERIALS Progress Report, 1 Jun. 1981 - 31 May 1982

S. L. Rice, H. Nowotny, and R. Solecki Dec. 1981 27 p refs
(Contract DE-AC02-81ER-10910)
(DE82-005336; DOE/ER-10910/01) Avail: NTIS HC A03/MF A01

The experimental and theoretical results from investigations conducted on the role of subsurface zones in wear of materials are presented. Wear tests in sliding and in the compound impact mode have been carried out on steels (2-1/4 Cr-Mo, 1045, 17-4 PH, 316 and CPM-10V) as well as on commercially pure metals Al, Mg, Ti, and on alloys of Al and Cu. Significant experimental results include SEM/EDAX data obtained from subsurface sections of work specimens, with quantitative information on material transport and composition of subsurface zones formed in situ. X-ray diffraction data provide further insight into mechanochemical processes which occur during wear. In addition, initial theoretical results from analysis of the state of stress arising during ring-on-ring experimentation are reported. In this, the method of successive elastic solutions was adapted for use with the subsurface analysis. This allows the consideration of realistic material behavior, including thermo-elastoplastic work hardening with temperature dependent physical properties. Analytical results are presented for temperature and equivalent stress distributions in a one-dimensional model. DOE

N82-29440# Illinois Univ., Urbana. Dept. of Physics.

MANY-BODY EFFECTS ON THE X-RAY SPECTRA OF METALS Ph.D. Thesis

Sashi Sekhar Satpathy 1982 104 p refs
(Contract DE-AC02-76ER-01198)
(DE82-006905; DOE/ER-01198/1372) Avail: NTIS HC A06/MF A01

The effects of band structure, of a solid surface, of temperature, and of disorder on the many-electron X-ray spectra of metals are evaluated in a change-of-mean-field approximation using a one-dimensional nearest-neighbor tight-binding model of a metal. The X-ray spectral shapes are determined by both the band structure and the final-state interactions. The effect of the band being non-free-electron-like is not felt at the X-ray threshold, but away from it such effects are noticeable. When the core hole is created at the surface, the spectra at the edge exhibit a Nozieres-de Dominicis-type singularity with the appropriate surface phase-shifts. At energies away from the edge, the one-particle effects are prominent with the X-ray emission and absorption spectra closely reflecting the local one-electron density of states. The recoil spectrum of a Fermi sea at a non-zero temperature has less asymmetry than the zero-temperature case. It was found that at ordinary temperatures the reduction of the asymmetry due to the thermal distribution of one-electron states is not very significant. Finally, using a one-dimensional Anderson model, the effect of lattice disorder on the X-ray absorption spectra is studied for the first time. DOE

N82-29441# Rockwell International Corp., Golden, Colo. Rocky Flats Plant.

STUDY OF THE FORMATION AND EFFECTS OF SIGMA PHASE IN 21-6-9 STAINLESS STEEL

C. L. Packard, M. C. Mataya, and C. M. Edstrom 7 Nov. 1981 38 p refs
(Contract DE-AC04-76DP-03533)
(DE82-004574; RFP-3031) Avail: NTIS HC A03/MF A01

The formation and effects of sigma phase in 21-6-9 stainless steels are summarized. Sigma phase was identified in forgings and as-rolled plate by color etching and microprobe analysis. In as-rolled plate sigma was found to start transforming from delta ferrite within 30 minutes at 1500 F, with almost complete transformation after 24 hours at 1500 F. The effect of sigma phase on room temperature mechanical properties was evaluated by tensile testing, Charpy impact testing, and impact shear testing. Sigma phase was found to severely reduce transverse ductility and longitudinal and transverse impact resistance. The greater the amount of sigma present, the greater was its effect on mechanical properties. Vendor contacts indicated that controlling delta ferrite to a minimum in the as-rolled plate is both possible and practical. DOE

N82-29442# Los Alamos Scientific Lab., N. Mex.

METHOD OF PREPARING POWDERS OF INTERMETALLIDES

T. M. Ulyanova, S. G. Tereshkova, and M. M. Paviyuchenko 1981 6 p Transl. into ENGLISH of Russian Patent no. 631259 (25 Oct. 1976)
(Contract W-7405-eng-36)
(DE82-005610; LA-tr-81-43) Avail: NTIS HC A02/MF A01

This patent covers the preparation of intermetallic compounds exhibiting superconducting, magnetic, heat resistant, elastically deforming, catalytic, and other properties that are vital for technical materials. Powders (intermetallides) are prepared by the thermal decomposition of organic compounds of metals. The organic compound of one metal is mixed in stoichiometric proportions with the powder of the other metal, and thermal decomposition is conducted in a current of an inert gas or in vacuo at 250 C to 8500 C. DOE

N82-29443# Technische Hogeschool Twente, Enschede (Netherlands).

FIM-ATOM PROBE INVESTIGATION OF THE BAINITE TRANSFORMATION IN A Cr Mo STEEL Ph.D. Thesis

Pieter Willem Bach 2 Jul. 1981 100 p refs Sponsored by the Nederlandse Organisatie voor Zulver Wetenschappelijk Onderzoek
(DE82-780187; INIS-mf-6830) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

To obtain a better understanding of the role played by Cr and Mo in the bainite transformation a Field-Ion Microscope - Atom Probe was constructed in order to study the distribution of the alloying elements near various types of boundaries on atomic scale. The distribution of alloying elements measured with this instrument is not so smooth on atomic scale as suggested by microprobe analysis. In a coherent twin boundary, formed during the bainite transformation, a depletion of the substitutionals Cr and Mo and an enhancement of the C content is observed, which is in accordance with the atomic model of a B.C.C. twin. In the twin plane the interstitial sites are even larger than the F.C.C. octahedral sites and this plane can act as an effective sink for the carbon atoms from bainitic ferrite. The depletion of Cr and Mo from the twin plane is due to interface coherency. DOE

N82-29444# Oak Ridge National Lab., Tenn. Chemical Technology Div.

IODINE SORPTION ON LOW-CHROMIUM ALLOY STEEL
M. F. Osborne, R. B. Briggs, and R. P. Wichner Jan. 1982 193 p refs
(Contract W-7405-eng-26)
(DE82-007738; ORNL/TM-7755) Avail: NTIS HC A09/MF A01

Iodine sorption on low alloy steel in helium atmosphere was investigated using both computer calculations and experimental measurements under conditions that could be related to the high temperature gas cooled reactor (HTGR). Adsorption measurements provide data on the potentially releasable inventory of iodine (a major radiological hazard) stored on surfaces in the coolant circuit during normal operation. Measurements of the rate and extent of iodine desorption when test conditions were changed are useful for evaluating the consequences of accidents. The results of calculations with the SOLGASMIX-PV computer program indicated that HI is the dominant iodine species in the system and that the deposition of CrI2(s) or FeI2(s) in the cooler regions will effectively limit the amount of iodine in the gas phase. Experimental measurements were obtained on 2 1/4% Cr-1% Mo steel specimens at iodine burdens as low as 1 million Pa (10 to the 11th power atm), about 100 times lower than any previous work. DOE

N82-29445# Westinghouse Electric Corp., Lester, Pa. Steam Turbine Generator Div.
REVIEW OF CORROSION-RESISTANT COATINGS FOR STEAM TURBINE COMPONENTS
L. D. Kramer Nov. 1981 112 p refs
(EPRI Proj. 1408-1)
(DE82-902229; EPRI-CS-2124) Avail: NTIS HC A06/MF A01

The state of the art of coating technology is reviewed for applicability to large steam turbine low pressure components. Twenty-four coating systems were identified as feasible for the subject application. These systems are applied by eleven different coating techniques which result in either sacrificial or barrier type coatings being deposited. Secondary factors such as deposited surface roughness, residual stresses, the need to reheat treat the material after coating, and cost are identified and discussed as required. Six coating vendors were visited. These vendors offered sixteen of the coating systems ultimately selected for the program. As a result of the literature surveys, vendor contacts, and review of the utility experiences, twenty-four coating systems were selected for future testing. DOE

N82-29446# Los Alamos Scientific Lab., N. Mex.
NONCONVENTIONAL HARD-METAL COMPOSITION
Haskell Sheinberg Nov. 1981 24 p refs
(Contract W-7405-eng-36)
(DE82-007015; LA-8934) Avail: NTIS HC A02/MF A01

A hard metal composition comprising borides and carbides of tungsten, nickel, and iron is made by reaction hot pressing mixtures of elemental tungsten, nickel, and iron powders with small quantities of boron carbide. The hardness of these compositions is in the range of the hardest conventional tungsten carbide cobalt compositions. It was subsequently determined that molybdenum can be substituted in part or totally for the tungsten in the composition with a minimum reduction in hardness. This new composition can be used in high pressure anvils; it sustains higher pressures than commercial carbides without plastic deformation. DOE

N82-29447# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
EFFECT OF SIMULATED MEDIUM-BTU COAL GASIFIER ATMOSPHERES ON THE BIAXIAL STRESS RUPTURE BEHAVIOR OF FOUR CANDIDATE COAL GASIFIER ALLOYS
R. M. Horton Dec. 1981 43 p refs
(Contract DE-AC07-76ID-01570)
(DE82-010614; EGG-FM-5657) Avail: NTIS HC A03/MF A01

Four candidate alloys for internal use in coal gasifiers were tested in four simulated coal gasifier atmospheres up to approximately 500 h. It was determined that biaxial stress rupture strength and life were adversely affected. It is found that exposure to these atmospheres at temperatures below 11720 K do not decrease these rupture properties below those measured in air. Only at 12550 K are the rupture properties in the various CGA atmospheres consistently below those measured in air at atmospheric pressure. DOE

N82-29448# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
TWO-BODY, DRY ABRASIVE WEAR OF Fe/Cr/C EXPERIMENTAL ALLOYS. RELATIONSHIP BETWEEN MICROSTRUCTURE AND MECHANICAL PROPERTIES M.S. Thesis
Chi Kong Simon Kwok Jan. 1982 59 p refs
(Contract W-7405-eng-48)
(DE82-010596; LBL-13393) Avail: NTIS HC A04/MF A01

A systematic study of abrasive wear resistance of Fe/Cr/Mn based alloys using a two body pin-on-disc wear machine is described. Abrasives used were silicon carbide, alumina and quartz. The abrasive wear resistance was evaluated and the relationships between microstructure, mechanical properties, and abrasive wear resistance for these experimental alloys investigated. Several commercial alloys were also tested to provide a basis for comparison. Grain refinement by double heat treatment was performed in order to increase wear resistance. DOE

N82-29449# National Materials Advisory Board, Washington, D. C. Commission on Sociotechnical Systems.
ASSESSMENT OF SELECTED MATERIALS ISSUES Final Report
Sep. 1981 106 p Sponsored by Library of Congress
(PB82-149360; NMAB-381) Avail: NTIS HC A06/MF A01 CSCL 11F

In a two-day seminar, the National Materials Advisory Board made an assessment of present and potential problems in the availability of steel, titanium, aluminum, and cobalt. The assessment covered selected conceivable events that could effect availability but did not predict the probability that such events would occur. Occurrence was assumed--i.e., What if the domestic production base for aluminum begins to move off-shore, and possible consequences were considered in the form of series of questions. Consensus answers or solutions were not sought and not attempt was made to do an in-depth literature study. The purpose was to identify the important questions to be considered. Concerns were raised that call for careful attention and continuing analysis, but none emerged that appear to warrant crisis action. The report includes an introductory description of the origin and scope of the assessment, an overall summary and analysis, summaries of the discussion and questions raised for each material, a background paper provided for thought prior to the seminar, and formal papers invited experts on the current status of each of the four metals. GRA

N82-29450# National Inst. for Metallurgy, Randburg (South Africa). Analytical Chemistry Div.
THE DETERMINATION BY DIFFERENTIAL PULSE ANODIC-STRIPPING VOLTAMMETRY AT THE THIN MERCURY-FILM ELECTRODE, OF CADMIUM AND THALLIUM IN SIX NIMROC REFERENCE MATERIALS
A. F. Lee 25 Sep. 1981 31 p refs
(PB82-140997; NIM-2128; ISBN-0-86999-553-7) Avail: NTIS HC A03/MF A01 CSCL 11F

A previously reported procedure was extended to include the determination of thallium. In samples where thalliium occurred in the presence of relatively high concentrations of cadmium, the stripping peak for cadmium was first suppressed with a non-ionic surface-active agent, Triton X-100. Cadmium and thallium were determined directly in six NIMROC reference materials without interference from iron(III), in a reducing electrolyte, which is also a complexing agent, consisting of 1 M ammonium chloride, 0, 1M citric acid, and 0,025M ascorbic acid. Interelement interferences were eliminated by the use of a mercury-film electrode of adequate thickness. The limits of detection for cadmium were 10ng/g and those for thallium 20ng/g. GRA

N82-30252*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REVIEW OF CORROSION CAUSES AND CORROSION CONTROL IN A TECHNICAL FACILITY

T. Charng and F. Lansing *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 145-156 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 11F

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N82-29451* National Aeronautics and Space Administration, Washington, D. C.
GLASS COMPOSITIONS WITH A HIGH MODULUS OF ELASTICITY
James F. Bacon, inventor (to NASA) (United Aircraft Corp., East Hartford, Conn.) 30 Mar. 1971 4 p Filed 16 Nov. 1967 Sponsored by NASA
(NASA-Case-HQN-10274-1; US-Patent-3,573,078;
US-Patent-Appl-SN-683465; US-Patent-Class-106-52) Avail: US Patent and Trademark Office CSCL 11C

Glass compositions comprising silica, alumina, and magnesia plus substantial quantities of an uncommon oxide such as lanthana, ceria, and yttria provide a formulation containing no toxic elements and capable of fiberization to produce filaments having a high modulus of elasticity.

Official Gazette of the U.S. Patent and Trademark Office

N82-29452* National Aeronautics and Space Administration, Washington, D. C.
HIGH MODULUS INVERT ANALOG GLASS COMPOSITIONS CONTAINING BERYLLIA Patent
James F. Bacon, inventor (to NASA) (United Aircraft Corp., East Hartford, Conn.) Issued 15 Jan. 1974 6 p Filed 21 Apr. 1972 Continuation-in-part of abandoned US Patent Appl. SN-874674, filed 6 Nov. 1969 Sponsored by NASA
(NASA-Case-HQN-10931-2; US-Patent-3,785,836;
US-Patent-Appl-SN-246295; US-Patent-Appl-SN-874674;
US-Patent-Class-106-50; US-Patent-Class-106-52;
US-Patent-Class-106-54) Avail: US Patent and Trademark Office CSCL 11C

Glass compositions having a Young's modulus of at least 15 million psi and a specific modulus of at least 110 million inches consisting essentially of, in mols, 10-45% SiO_2, 2-15% Li_2O, 3-34% BeO, 12-36% of at least one bivalent oxide selected from the group consisting of CaO, ZnO, MgO and CuO, 10-39% of at least one trivalent oxide selected from the group consisting of Al_2O_3, B_2O_3, La_2O_3, Y_2O_3 and the mixed rare earth oxides, the total number of said bivalent and trivalent oxides being at least three, and up to 10% of a tetravalent oxide selected from the group consisting of ZrO_2, TiO_2 and CeO_2.

Official Gazette of the U.S. Patent and Trademark Office

N82-29453* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FULLY PLASMA-SPRAYED COMPLIANT BACKED CERAMIC TURBINE SEAL Patent
Robert C. Bill and Donald W. Wisander, inventors (to NASA) Issued 22 Jun. 1982 4 p Filed 30 Mar. 1980 Supersedes N80-24619 (18 - 15, p 1985)
(NASA-Case-LEW-13268-1; US-Patent-4,336,276;
US-Patent-Appl-SN-145209; US-Patent-Class-427-34;
US-Patent-Class-415-174; US-Patent-Class-427-423) Avail: US Patent and Trademark Office CSCL 11A

A seal having a high temperature abradable lining material encircling the tips of turbine blades in turbomachinery is discussed. The minimum operating clearances between the blade tips and the lining of a high pressure turbine are maintained. A low temperature easily decomposable material, such as a polymer, in powder form is blended with a high temperature oxidation resistant metal powder. The two materials are simultaneously deposited on a substrate formed by the turbine casing. Alternately, the polymer powder may be added to the metal powder during plasma spraying. A ceramic layer is then deposited directly onto the metal polymer composite. The polymer additive mixed with the metal is then completely volatilized to provide a porous layer between the ceramic layer and the substrate.

Official Gazette of the U.S. Patent and Trademark Office

N82-29454* National Aeronautics and Space Administration, Washington, D. C.
NON-TOXIC INVERT ANALOG GLASS COMPOSITIONS OF HIGH MODULUS Patent
James F. Bacon, inventor (to NASA) (United Aircraft Corp., East Hartford, Conn.) Issued 21 May 1974 5 p Sponsored by NASA Continuation in part of abandoned US Patent Appl. SN-874673, filed 6 Nov. 1969
(NASA-Case-HQN-10328-2; US-Patent-3,811,901;
US-Patent-Appl-SN-246294; US-Patent-Appl-SN-874673;
US-Patent-Class-106-50; US-Patent-Class-106-52;
US-Patent-Class-106-54) Avail: US Patent and Trademark Office CSCL 11C

Glass compositions having a Young's modulus of at least 15 million psi are described. They and a specific modulus of at least 110 million inches consist essentially of, in mols, 15 to 40% SiO_2, 6 to 15% Li_2O, 24 to 45% of at least two bivalent oxides selected from the group consisting of Ca, NzO, MgO and CuO; 13 to 39% of at least two trivalent oxides selected from the group consisting of Al_2O_3, Fe_2O_3, B_2O_3, La_2O_3, and Y_2O_3 and up to 15% of one or more tetravalent oxides selected from the group consisting of ZrO_2, TiO_2 and CeO_2. The high modulus, low density glass compositions contain no toxic elements. The composition, glass density, Young's modulus, and specific modulus for 28 representative glasses are presented. The fiber modulus of five glasses are given.

Official Gazette of the U.S. Patent and Trademark Office

N82-29455* National Aeronautics and Space Administration, Washington, D. C.
HIGH MODULUS RARE EARTH AND BERYLLIUM CONTAINING S !CATE GLASS COMPOSITIONS Patent
James F. Bacon, inventor (to NASA) (United Technologies Corp., East Hartford, Conn.) Issued 30 Mar. 1976 5 p Filed 2 Jun. 1972 Sponsored by NASA Continuation in part of abandoned US Patent Appl. SN-874675, filed 6 Nov. 1969
(NASA-Case-HQN-10595-1; US-Patent-3,947,281;
US-Patent-Appl-SN-259056; US-Patent-Appl-SN-874675;
US-Patent-Class-106-52; US-Patent-Class-106-50) Avail: US Patent and Trademark Office CSCL 11B

Glass compositions having a Young's modulus of at least 16 million psi and a specific modulus of at least 110 million inches consisting essentially of approximately, by weight, 20 to 43% SiO_2, 8 to 21% Al_2O_3, 4 to 10% BeO, 27 to 58% of at least one oxide selected from a first group consisting of Y_2O_3, La_2O_3, Nd_2O_3, Ce_2O_3, Ce_2O_3, and the mixed rare earth oxides, and 3 to 12% of at least one oxide selected from a second group consisting of MgO, ZrO_2, ZnO and CaO are described. The molar ratio of BeO to the total content of the first group oxides is from 1.0 to 3.0.

Official Gazette of the U.S. Patent and Trademark Office

N82-29456* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ATTACHMENT SYSTEM FOR SILICA TILES Patent
Robert L. Dotts (Rockwell International Corp., Downey, Calif.) and Jack W. Holt, inventors (to NASA) (Rockwell International Corp., Downey, Calif.) Issued 6 Jul. 1982 7 p Filed 17 Dec. 1980 Supersedes N81-16110 (19 - 07, p 0868) Sponsored by NASA
(NASA-Case-MSC-18741-1; US-Patent-4,338,368;
US-Patent-Appl-SN-217336; US-Patent-Class-428-212;
US-Patent-Class-156-329; US-Patent-Class-244-121;
US-Patent-Class-244-158A; US-Patent-Class-244-160;
US-Patent-Class-244-163; US-Patent-Class-428-49;
US-Patent-Class-428-218; US-Patent-Class-428-283;
US-Patent-Class-428-289; US-Patent-Class-428-307.7;
US-Patent-Class-428-311.5; US-Patent-Class-428-312.6;
US-Patent-Class-428-317.9; US-Patent-Class-428-325;
US-Patent-Class-428-446) Avail: US Patent and Trademark Office CSCL 11A

An improved method for markedly increasing the bond strength between a rigid, porous refractory material and non-rigid substrate by densifying the face of the rigid material opposing the substrate is discussed. Densification is accomplished by

wetting the refractory material and then impregnating it with a composite slurry having a particle size to fill voids of the porous material.

Official Gazette of the U.S. Patent and Trademark Office

N82-29457# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).

IMPROVEMENTS IN WATERPROOFING MEMBRANES BY MODIFYING BITUMEN WITH THERMOPLASTIC POLYMER

S. Piazza, A. Arcozzi, F. Balestrazzi, C. Verga, and S. Donato Milanese 1982 50 p refs Transl. into ENGLISH from Poliplasti (Italy), v. 27, no. 257, 1979 p 91-102

(NRC/CNR-TT-201[1]; ISSN-0077-5606) Avail: NTIS HC A03/MF A01

Waterproofing of roofs with impermeable membranes based on bitumen modified with high modulus materials is widely employed. The mechanical and viscoelastic behavior of bitumen, either at low or at high temperatures, are appreciably improved by addition of thermoplastic polymers such as styrene-butadiene-styrene rubbers and atactic polypropylene. Such materials exhibit a complementary use but to obtain the optimum properties it is necessary that compatible bitumens be used and that a proper mixing of the bitumen and thermoplastic polymers be achieved. S.L.

N82-29458*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

BOUNDARY LUBRICATION: REVISITED

William R. Jones, Jr. 1982 33 p refs Presented at Meeting of the Am. Soc. of Lubrication Engr., Independence, Ohio, 9 Mar. 1982

(NASA-TM-82858; E-1181; NAS 1.15:82858) Avail: NTIS HC A03/MF A01 CSCL 11G

A review of the various lubrication regimes, with particular emphasis on boundary lubrication, is presented. The types of wear debris and extent of surface damage is illustrated for each regime. The role of boundary surface films along with their modes of formation and important physical properties are discussed. In addition, the effects of various operating parameters on friction and wear in the boundary lubrication regime are considered.

Author

N82-29459*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

TRIBOLOGICAL EVALUATION OF COMPOSITE MATERIALS MADE FROM A PARTIALLY FLUORINATED POLYIMIDE

Robert L. Fusaro Apr. 1982 40 p refs

(NASA-TM-82832; E-1199; NAS 1.15:82832) Avail: NTIS HC A03/MF A01 CSCL 11G

Preliminary tribological studies on a new polyimide formulated from the diamine 2,2-bis [4-(4-aminophenoxy) phenyl] hexafluoropane (4-BDAF) indicates polyimides made from this diamine have excellent potential for high temperature applications. Two different polyimides were formulated from the diamine, and five different composites were formulated using one of the polyimides. Composites were made using 10 weight percent (w/o) graphite fluoride powder, 20 w/o PTFE powder, 30 w/o silver powder, or 50 w/o carbon fibers, both graphitic and nongraphitic types. The powder additions did not improve the tribological properties as much as the carbon fibers, and the graphitic fibers produced better results than did the nongraphitic fibers. Results also indicated that improved high temperature stability and tribological properties may be obtained with a polyimide made from the dianhydride pyromellitic acid (PMDA) rather than the dianhydride benzophenonetetracarboxylic acid (BTDA). Author

N82-29460*# Boeing Aerospace Co., Seattle, Wash.

EVALUATION OF HIGH TEMPERATURE STRUCTURAL ADHESIVES FOR EXTENDED SERVICE Final Report

S. G. Hill, P. D. Peters, and C. L. Hendricks Jul. 1982 380 p refs

(Contract NAS1-15605)

(NASA-CR-165944; NAS 1.26:165944; D180-27150-1) Avail: NTIS HC A17/MF A01 CSCL 11A

The evaluation, selection, and demonstration of structural adhesive systems for supersonic cruise research applications, and establishment of environmental durability of selected systems for up to 20,000 hours is described. Ten candidate adhesives were initially evaluated. During screening and evaluation, these candidates were narrowed to three of the most promising for environmental durability testing. The three adhesives were LARC-13, PPQ, and NR056X. The LARC-13 was eliminated because of a lack of stability at 505 K. The NR056X was removed from the market. The LARC-TPI was added after preliminary evaluation and an abbreviated screening test. Only PPQ and LARC-TPI remained as the reasonable candidates late into the durability testing. Large area bond panels were fabricated to demonstrate the processibility of the selected systems. Specifications were prepared to assure control over critical material and process parameters. Surface characterization concentrated primarily upon titanium surface treatments of 10 volt chronic acid anodize, 5 volt chromic acid anodize and PASA-JELL. Failure analysis was conducted on lap shear adhesive bond failures which occurred in PPQ and LARC-13 test specimens after 10,000 hours at 505 K. J.D.

N82-29461# Effects Technology, Inc., Santa Barbara, Calif.

INVESTIGATION OF LIQUID DROP IMPACT ON CERAMICS Final Report, 24 Mar. 1976 - 31 May 1982

William F. Adler 31 May 1982 103 p refs

(Contract N00014-76-C-0744)

(AD-A114981; ETI-CR-82-1075) Avail: NTIS HC A06/MF A01 CSCL 11/2

The initial objective for this effort was to obtain an understanding of the response of ceramic materials on a microstructural level when subjected to water drop impact conditions (rain erosion). Before this objective could be satisfied it was necessary to have a well-controlled experimental arrangement so that the observed material damage, especially for very minor surface disruptions, could be related to a well-defined loading condition. A significant portion of the effort was devoted to achieving this test condition. GRA

N82-29462# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.

CHEMICAL STRESS CRACKING OF ACRYLIC FIBERS

J. Herms, L. H. Peebles, Jr., and D. R. Uhlmann May 1982 57 p refs

(Contract N00014-75-C-0542)

(AD-A114555; TR-14) Avail: NTIS HC A04/MF A01 CSCL 11/9

The generation of periodic microscopic transverse cracks in oriented acrylic fibers immersed in hot alkaline hypochlorite solution is described in detail and shown to be a variety of chemical stress cracking. It is greatly accelerated by external tensile stress, high fiber permeability, moderate fiber orientation, and water-plasticization. The proposed mechanism for bond cleavage involves cyclization of nitrile groups (similar to the 'prefatory reaction' in pyrolysis of acrylic fibers), followed immediately by N-chlorination and chain scission. Mechanical retractile forces (internal or external) then cause chain retraction and crack growth. Despite the remarkable regularity of the crack pattern, which typically resembles a series of stacked lamellae, the process is independent of any such underlying fiber morphology. The cracking process does, however, appear to be a sensitive indicator of residual latent strain in the fiber, which may persist even after high-temperature annealing. Author (GRA)

N82-29463# Michigan Univ., Ann Arbor. Dept. of Materials and Metallurgical Engineering.

PROCESS DEVELOPMENT FOR SILICON CARBIDE BASED STRUCTURAL CERAMICS Interim Report, 1 Jan. - 31 Aug. 1981

Edward E. Hucke Feb. 1982 65 p refs

(Contract DAAG46-80-C-0056)

(AD-A114834; AMMRC-TR-82-10) Avail: NTIS HC A04/MF A01 CSCL 11/2

The objective of this program is to develop a process for making shaped silicon carbide based ceramic materials with reduced microstructural flaw size by in situ reaction of silicon with fine, ultra-uniform pored carbon skeletons that are produced from liquid polymer solutions without particulate additions. Subsidiary objectives are: (1) delineation of the maximum section size producible while maintaining microstructural uniformity; (2) production of microstructures with characteristic features

reduced from the current level of approximately 5-10 microns to the level of 1 micron or less; (3) characterization of microstructure, corresponding strength levels, and statistical uniformity; and (4) delineation of dimensional tolerances and surface finish that can be held during processing without finished machining. Very uniform and reproducible carbon skeletons have been produced and modified to provide for easy siliconization without extensive grain coarsening or formation of silicon veins and/or lakes have been achieved from 1 cm thick samples of carbon skeleton with particle size of 3.2 microns and pore size of 1.9 micrometers. The siliconized material has a maximum grain size of < 10 micrometers and a Weibull characteristic four point bend strength of 660 mPa, which significantly exceeds other reaction bonded silicon carbide materials and compares favorably with hot pressed SiC (NC203) tested under similar circumstances. GRA

N82-29464# Brookhaven National Lab., Upton, N. Y.
WATER-COMPATIBLE POLYMER CONCRETE MATERIALS FOR USE IN RAPID REPAIR SYSTEMS FOR AIRPORT RUNWAYS Final Report, Mar. 1980 - Feb. 1981
T. Sugama and L. E. Kukacka Mar. 1981 128 p refs
(Contracts AFOSR ISSA 80-00027; DE-AC02-76CH-00016; AF Proj. 2307)
(DE82-010994; BNL-51390; AFOSR-81-0589TR) Avail: NTIS HC A07/MF A01

Water-compatible polymer concrete (PC) formulations were developed which appear to have potential for use in all-weather rapid repair procedures for bomb-damaged runways. Formulations consisting of furfuryl alcohol, water-saturated aggregate, dry silica flour, promoters, and catalysts produced composites with properties suitable for repair purposes when mixed and polymerized at temperatures from -200 to 300 C. Calcium-unsaturated polyester complexed PC also produced excellent properties. However, the early strength criteria [2000 psi (13.78 MPa) at 1 h] and other requirements such as compatibility of the formulation with water and practical working times could be attained only at temperatures > 200 C. This system can be polymerized under water. Studies of the polymerization reaction mechanisms, materials properties, costs, and potential placement methods were performed. DOE

N82-29465# Pennsylvania State Univ., University Park. Lab. of Materials Research.
STRUCTURE OF GLASSES CONTAINING TRANSITION-METAL ION Progress Report, 1 Feb. - 31 Dec. 1981
William B. White and I. S. T. Tsong 5 Jan. 1982 62 p refs
(Contract DE-AS02-76ER-02754)
(DE82-011586; DOE/ER-02754/7) Avail: NTIS HC A04/MF A01

The structure and properties of insulator glasses, particularly as these are modified by transition metal ions in solution, were investigated. The host glasses considered are primarily the alkali aluminosilicates, with some effort expended on zinc containing glasses. The main interest is the structural setting for aluminum. The optical absorption spectra of nickel, cobalt, and chromium in a variety of glasses were examined. Quantitative calculations of diffusion processes by sputter induced photon spectrometry were performed, with emphasis on hydrogen diffusion. The counter diffusion of alkali ions and hydrogen ternary glasses was fitted to a diffusion model. DOE

N82-29466# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.
PROPERTIES OF GLASSES WITH HIGH WATER CONTENT Progress Report, 1 Feb. - 31 Dec. 1981
Minoru Tomozawz and Edward Bruce Watson Jan. 1982 21 p refs
(Contract DE-AC02-79ER-10453)
(DE82-011574; DOE/ER-10453/03) Avail: NTIS HC A02/MF A01

Glasses with high water content were investigated. When plotted against water content, the electrical conductivity of sodium silicate glasses shows a pronounced minimum at 3 approx. 4 wt% water content. The diffusion coefficient of sodium follows the same trend. At low water content the interaction between water and alkali ions is similar to that in the mixed alkali glasses, while at high water content, water disrupts the glass network structure making the alkali mobility easier. Chemical durability determined from the leach rate of sodium in water and the HF etching rate of glasses with high water content decreased with water content. The radiation coloration resistant characteristics of glasses increased with water content. The OH concentration in glass increased with radiation dosage suggesting the conversion of H2O to OH by radiation. Both the glass transition temperature and density of glasses decreased monotonically with increasing water content. DOE

N82-29467# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
VOID BEHAVIOR DURING CREEP AND SINTERING AT HIGH TEMPERATURES Ph.D. Thesis
Chun-Hway Hsueh Sep. 1981 114 p refs
(Contract W-7405-eng-48)
(DE82-005793; LBL-13397) Avail: NTIS HC A06/MF A01

Pores in ceramics are often found both in the process of fabrication and in service. Void formation and propagation under an applied tensile stress and final stage of sintering is studied. Creep rupture in ceramics is discussed. The motion of pores attached to two grain interfaces is studied. DOE

N82-29468# Sandia Labs., Albuquerque, N. Mex.
CASTABLE CERAMICS FOR HYDROTHERMAL ENVIRONMENTS: MATERIALS EVALUATIONS FOR THE IN-SITU HEAT TRANSFER EXPERIMENT
Bruce C. Bunker Jan. 1982 33 p refs
(Contract DE-AC04-76DP-00789)
(DE82-007098; SAND-81-1882) Avail: NTIS HC A03/MF A01

A group of castable ceramics was evaluated for use in a heat source implantation rod. Requirements for the material are long term chemical durability in high temperature seawater in addition to high compressive strength and low thermal conductivity. Test results suggest that siloxane based polymer concrete materials exceed these requirements. DOE

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N82-29469 British Library Lending Div., Boston Spa (England).
MARKET PROSPECTS AND ECONOMICS OF NUCLEAR GASIFICATION OF COAL TO SYNTHETIC NATURAL GAS
W. Breyer, D. Wiegand, K. H. Bode, D. Oesterwind, and L. Schrader 23 Jun. 1982 16 p refs Transl. into ENGLISH from Reaktortagung (West Germany), 1977 p 1011-1014
(BLL-Risley-Tr-4106-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

Potential uses of synthetic natural gas (SNG) and nuclear district heating are summarized. Costs and economics of SNG production are considered. Fast reactors development in the U.S.S.R. is reviewed. N.W.

N82-29470# Materials Research Labs., Melbourne (Australia).
INFLUENCE OF HNS ON THE MICROSTRUCTURE AND PROPERTIES OF CAST TNT
M. A. Parry and B. W. Thorpe Apr. 1981 32 p refs
(MRL-R-812; AR-002-410) Avail: NTIS HC A03/MF A01

The influence of the additive 2,2',4,4'6,6' hexanitrostilbene (HNS) on the physical properties of cast 2,4,6-trinitrotoluene (TNT) was studied. As little as 0.3% HNS incorporated by the cycle cast technique effects exceptional grain modification of the TNT, with an associated fourfold increase in strength. The same grain modification and increase in mechanical strength were achieved by the addition of preproduced (TNT)2HNS complex to TNT at 90 C, and was unaffected by holding at that temperature for up to 4 h before casting. The simple inclusion of HNS caused a minor modification of the grain structure of TNT castings and a smaller increase in their mechanical strengths. These results

are consistent with the inferior nucleation efficiency of HNS compared with the (TNT)2HNS complex. S.L.

N82-29471 British Library Lending Div., Boston Spa (England).
RESEARCH AND DEVELOPMENT WORK ON THE GASIFICATION OF COAL BY HYDROGENATION WITH NUCLEAR PROCESS HEAT WITHIN THE SCOPE OF THE DESIGN PHASE OF THE PNP-PROJECT
L. Schrader 28 May 1982 87 p Transl. into ENGLISH of rept. T-78-25 Rheinische Braunkohlenwerke AG, Cologne, Dec. 1976
(BLL-Trans-T5837/BG/MRS14581/82; T-78-25) Avail: British Library Lending Div., Boston Spa, Engl.

The planning, erection, and operation of a semitechnical pilot plant for hydrogasification of coal in a fluidized bed with an input of 100 kg C/h are described. Process data are presented using both lignite (brown coal) and hard coal. Operating results obtained during the development phase demonstrated that hydrogasification is suitable as a component of a large scale gasification unit. J.D.

N82-29472# Army Facilities Engineering Support Agency, Fort Belvoir, Va. Technology Support Div.
WASTE VEGETABLE OIL AS A FUEL EXTENDER Final Report
James F. Thompson, Jr. Oct. 1981 44 p
(AD-A113488; USAFESA-T-2101) Avail: NTIS HC A03/MF A01 CSCL 11/8

This report presents the conditions under which waste hydrogenated vegetable oil can be mixed with waste and virgin petroleum oils and remain in a homogeneous state. GRA

N82-29473# Army Facilities Engineering Support Agency, Fort Belvoir, Va. Technology Support Div.
COAL-OIL MIXTURES PROBLEMS AND OPPORTUNITIES
James F. Thompson, Jr. 15 Jan. 1982 26 p refs
(AD-A113533; USAFESA-T-2100) Avail: NTIS HC A03/MF A01 CSCL 21/4

This report presents the problem areas and identifies solutions for implementing Coal-Oil Mixture Technology. The report also contains an overview of industrial and Government experiences in fuel production, stabilization, and combustion. The report provides references and points of contact/addresses of those manufacturers currently involved in Coal-Oil Mixture Technology. Author (GRA)

N82-29474# Mason and Hanger-Silas Mason Co., Inc., Amarillo, Tex.
INITIATION OF PBX 9404, PENTOLITE AND TNT SPHERES
G. T. West Jan. 1982 16 p refs
(Contract DE-AC04-76DP-00487)
(DE82-010383; MHSMP-82-01) Avail: NTIS HC A02/MF A01

In solving the problem of simultaneous output from a spherical explosive charge, it was decided that offsetting the detonator below the equator should provide simultaneity. Optimum detonator offsets that will provide near simultaneous output at spherical surfaces were determined for PBX 9404, 50/50 Pentolite, and TNT initiated by the RP-2 Detonator. L.F.M.

N82-29475# Computer Sciences Corp., Bay St. Louis, Miss.
HAZARDS TESTING OF AMMONIUM PERCHLORATE Final Report, Mar. - Apr. 1982
F. L. McIntyre, D. Westover, and J. Caltagirone Dover, N.J. Army Armament Research and Development Command May 1982 58 p refs
(Contract MIPR-1311-1076)
(AD-A114966; AD-E400842) Avail: NTIS HC A04/MF A01 CSCL 19/1

A series of hazard classification tests were conducted on ammonium perchlorate, nominal 200-micron size, packaged in 113.6 liter (30 gallon) DOT 37A-350, 20-gage steel drums with bolted ring closures, each containing approximately 113.4 kg (250 lb) of material. All tests were conducted in accordance with INTEREG, Transport of Dangerous Goods, 1981 Edition. GRA

N82-29476# UOP, Inc., Des Plaines, Ill.
UNITED STATES AIR FORCE SHALE OIL TO FUELS, PHASE 2 Interim Technical Report, 1 Apr. 1979 - 30 Sep. 1980
J. R. Wilcox, J. G. Sikonia, T. G. Board, and F. J. Riedl Wright-Patterson AFB, Ohio AFWAL Nov. 1981 295 p refs (Contract F33615-78-C-2079)
(AD-A114531; AFWAL-TR-81-2116) Avail: NTIS HC A13/MF A01 CSCL 21/4

Phase II of this project was conducted to demonstrate innovative technology to reduce the cost of converting shale oil to high yields of aviation turbine fuels. To carry out this program, UOP selected a processing scheme involving hydrocracking as the primary conversion unit. The Phase II program included pilot plant processing, fouling studies and economic analysis. The pilot plant operations performed during Phase II involved four specific processing steps: feed preparation, low pressure hydrotreating, high pressure hydrotreating, and hydrocracking. Two shale oil feedstocks were utilized for each processing step: shale oil derived from Occidental Modified In-Situ retort and shale oil obtained from the Paraho direct-heated retort. Using data generated from the pilot plant operations and the study basis provided by the USAF, economic analyses were performed to find the cost of production of jet fuel, and total liquid product at a 15% discounted cash flow rate of return (DCFRR) on investment. GRA

N82-29477# Finnish Energy Economy Association, Helsinki.
CLASSIFICATION AND PROPERTIES OF PEAT FOR FUEL PURPOSES
B. Berggren, Anssi Kalmari, and Pentti Leino 1980 30 p refs
(DE82-900924; EKONO-158) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

The normal peat classification systems used to determine the types of peat and the degree of decomposition are provided. The properties of peat as a fuel are discussed starting from practical production parameters applied in Finnish conditions. Chemical composition, heating values, moisture content, and bulk densities form the basis for fuel use. Boiler and furnace design depends on several factors which are discussed. Basic differences between milled peat, sod peat, peat briquettes and peat pallets, which are the normal commercial forms in which peat can be obtained in Finland, are described. DOE

N82-29478# Naemnden foer Energiproduktionsforskning, Stockholm (Sweden).
STUDY OF THE ECONOMICS OF INTRODUCING GAS AS AN ENERGY CARRIER
Mar. 1981 211 p In SWEDISH
(DE82-900915; NE/TO-81/6) Avail: NTIS (US Sales Only) HC A10/MF A01; DOE Depository Libraries

At present, Sweden does not have any infrastructure for handling and transportation of fuel gas. The investment and operating costs for transportation through networks of different sizes from a gas producer to the consumers is estimated. The model used includes a coal gasification plant situated in the vicinity of a harbor on the Swedish North Sea coast. The scenarios include production of gas of different quality (high-low Btu values, city gas) and distribution nets of varying lengths. The techniques and equipment utilized for gas distribution are described. DOE

N82-29479# Atomic Energy of Canada Ltd., Chalk River (Ontario). Physical Chemistry Branch.
GASOLINE AND OTHER TRANSPORTATION FUELS FROM NATURAL GAS IN CANADA
E. A. Symons and A. I. Miller Mar. 1981 33 p refs In ENGLISH; FRENCH summary
(DE81-700550; AECL-7258) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

Ways in which natural gas might displace crude oil as a source of fuels for the Canadian transportation market are reviewed. Three approaches are possible; (1) direct use as compressed natural gas, (2) conversion of natural gas to methanol, and (3) further conversion of methanol to synthetic gasoline. DOE

N82-29480# SRI International Corp., Menlo Park, Calif.
TECHNOECONOMIC EVALUATION OF THE NYU ACID

HYDROLYSIS PROCESS FOR PRODUCING ETHANOL FROM MUNICIPAL SOLID WASTE Final Report
K. T. Semrau and J. L. Jones Oct. 1981 52 p refs
(Contract DE-AC01-80CS-24318)
(DE82-002027; DOE/CS-24318/T1) Avail: NTIS HC A04/MF A01

The acid hydrolysis process employs a type of hydrolysis reactor that is apparently unique in this application and that is intended to be particularly well suited to this type of process. From an economic viewpoint, the issue ultimately is whether the use of this reactor system reduces the cost of the hydrolysis process sufficiently to make production of sugars from lignocellulosic materials competitive with conventional production from sugar and starch crops. The probable cost of producing ethanol from the lignocellulosic fraction of municipal solid waste is estimated. DOE

N82-29481# Bendix Corp., Kansas City, Mo.
ELECTRICAL PROPERTIES OF FLEXIBLE DETONATOR CABLES
M. B. Mallory and B. L. Gerhardt Jan. 1982 17 p
(Contract DE-AC04-76DP-00613)
(DE82-010214; BDX-613-2750) Avail: NTIS HC A02/MF A01

Electrical properties of flexible detonator cables were evaluated. Tests were conducted to measure leakage current between conductors, high potential voltage for failure between conductors, surge cycles required for failure, and effects of lamination pressure on high voltage performance. The tests confirmed the 10 kV, 2 (SIGMA)A electrical criteria for inspection. Optimum lamination pressure was 4.14 MPa. Repeated testing did not appreciably degrade the dielectric material. DOE

N82-29482# Massachusetts Univ., Amherst. Dept. of Microbiology.
CONVERSION OF CELLULOSE TO ETHANOL BY MESOPHILIC BACTERIA Progress Report
Ercole CanaleParola 27 Nov. 1981 8 p
(Contract DE-AC02-81ER-10878)
(DE82-005333; DOE/ER-10878/1) Avail: NTIS HC A02/MF A01

Eight strains of anaerobic mesophilic cellulolytic bacteria were isolated from the mud of a freshwater pond and swamp. The isolation procedure involved serial dilution of the mud into cellulose-containing agar media. The isolates were rod-shaped and formed terminal, spherical to oval spores that swelled the sporangium. All strains fermented cellulose producing primarily ethanol, acetate, CO2, and H2. Growth and cellulose fermentation occurred between 220 and 400 C, but not at 150 and 450 C. The isolates differed from thermophilic cellulolytic clostridia not only in growth temperature range, but also because they fermented five-carbon products of plant polysaccharide hydrolysis, such as D-xylose and L-arabinose. Other fermentable substrates included xylan, D-glucose, cellobiose and, for three strains, D-galactose. None of the strains utilized maltose, surcrose, D-galacturonate, or amino acids as growth substrates. All isolates had a Gram-negative reaction and were motile by means of peritrichous flagella. Author

N82-29483# Teitel (Robert J.) Associates, San Diego, Calif.
MICROCAVITY HYDROGEN STORAGE Final Progress Report
Robert J. Teitel May 1981 45 p refs
(Contract DE-AC02-76CH-00016)
(DE82-006969; BNL-51439) Avail: NTIS HC A03/MF A01

In a microcavity storage system, high pressure hydrogen is stored in hollow, glass microspheres, 5 to 150 (SIGMA)m. The performance of commercially available microspheres was evaluated for this application. Eight grades were rated and their characteristics are presented. A substantial fraction of the microsphere beds survived the conditions of storing hydrogen at pressures of 400 atm establishing that the concept of high pressure hydrogen storage is feasible. Information was gathered on the properties of the survivor microspheres. Processes for their selective recovery are being investigated. DOE

N82-29484# Brookhaven National Lab., Upton, N. Y. Technology and Data Div.
ANALYSIS OF THE USE OF HYDROGEN AS A SUPPLEMENT TO NATURAL GAS
J. DAcierno and M. Beller Sep. 1981 50 p refs
(Contract DE-AC02-76CH-00016)
(DE82-006844; BNL-51442) Avail: NTIS HC A03/MF A01

The concept of hydrogen supplementation of natural gas with the added option of hydrogen separation from mixtures is evaluated. A 1977 study by an Ad Hoc Committee is reevaluated in terms of the present energy situtions with emphasis on specific incentives and barriers to the long term implementation of the concept. A systematic analysis of the concept is presented including the selection of a site where the concept could penetrate the existing energy system infrastructure, a survey of the industrial hydrogen market, and an economic analysis to determine the conditions necessary for feasibility. The minutes of a workshop held during the study are appended. DOE

N82-29485# Ross (James F.), Naperville (Ill.)
GASOHOL BY DIRECT EXTRACTION OF AQUEOUS FERMENTS. PHASE 1, EXPERIMENTAL AND PILOT PLANT DESIGN Final Report
J. F. Ross 20 Nov. 1981 50 p refs
(Contract DE-FG02-81AF-92003)
(DE82-004889; DOE/AF-92003/T1) Avail: NTIS HC A03/MF A01

The objective of this project is to develop a process to extract ethanol from fermentation liquor into lead free gasoline to form gasohol and an aqueous phase suitable for further processing. To accomplish this objective, Phase 1 of this project set out to specifically: review technical literature for prior art pertaining to this process; develop analytical techniques, where necessary; obtain basic physico - chemical and engineering data; demonstrate feasibility of process in laboratory scale glassware equipment; conduct preliminary engine testing of small samples; design pilot plant to demonstrate technical and economic feasibility of the process on a larger scale; minimize energy requirements; and maintain ecological quality. Laboratory experiments indicate the feasibility of extracting distillate from fermentation with lead free gasoline. Preliminary engine experiments indicate that the extract performs satisfactorily in small internal combustion engines. A pilot plant for larger scale experiments has been designed, however, further pilot planting is necessary to design a viable commercial unit. DOE

N82-29486# Aerospace Research Corp., Roanoke, Va.
DEVELOPMENT OF WOOD AS AN ALTERNATIVE FUEL FOR LARGE POWER-GENERATING SYSTEMS. PART 1: RESEARCH ON WOOD-BURNING GAS TURBINES Final Report
Joseph T. Hamrick and Thomas M. Hamrick Sep. 1981 87 p refs
(Contract DE-AC05-78ET-20058)
(DE82-002034; DOE/ET-20058/T2-Pt-1) Avail: NTIS HC A05/MF A01

Research is reported on the burning of pulverized green wood in suspension as a power plant fuel. Burner systems suitable for research into retrofitting of central station boilers as well as gas turbines were designed, built, and tested. It was determined that with combustion air preheated to 10000 F, green wood chips pulverized to pass a 1/2 in. screen could be burned completely in suspension in a distance of 20 ft. For gas turbines where the combustion products must be mixed with air for cooling to 1500 to 18000 F before passing through the turbine, it was necessary to use smaller and partially dried wood particles to achieve complete combustion in the 20 ft distance. A gas cleaning method recently developed for effluent from coal-fired pressurized fluidized beds was adapted for use with the wood suspension burner and applied to a 500 hp gas turbine. The theoretical analyses, and results of computations made in the design of the gas turbine combustion system are provided together with preliminary experimental results. Conclusions from the program are that retrofitting of large boiler systems is less practical from an economic and wood supply standpoint than installation of 15 to 20 MW combined cycle gas turbine systems at 10 to 20 mile intervals in the forested areas of the country. The financial mechanism for spawning such a dispersed power generation program was provided by the Public Utility Regulatory Policy Act of 1978. Power in 15 to 20 MW amounts can be fed into

most distribution lines in the US. Wheeling power in this manner from small, efficient power producing systems can save on fuel transportation and power distribution costs while providing local jobs. A 18 MW system with commercially available modular components was designed. The projected capital cost is less than $600 per installed KW (1981) and the estimated operating efficiency is 32 to 33%. GRA

N82-29487# Aerospace Research Corp., Roanoke, Va.
DEVELOPMENT OF WOOD AS AN ALTERNATIVE FUEL FOR LARGE POWER-GENERATING SYSTEMS. PART 2: SELECTION OF AN OIL- OR GAS-FIRED BOILER SYSTEM FOR RETROFIT Final Report
Joseph T. Hamrick Sep. 1981 30 p refs
(Contract DE-AC05-78ET-20058)
(DE82-002033; DOE/ET-20058/T2-Pt-2) Avail: NTIS HC A03/MF A01

Four boiler systems which use oil as a fuel were studied to determine the feasibility of retrofitting them to burn wood as an alternative fuel for power plants. It was concluded that direct burning of wood in one of the systems provides an economical alternative and that conversion of the three remaining boilers to operation in a waste heat mode in a combined cycle with wood burning-gas turbines offered the greatest economy of operation. Boiler system no. 1 of the Eugene, Oregon Water and Electric Board was chosen as the most viable candidate for retrofitting. An evaluation of that system was made and a preliminary retrofit design was developed. The retrofit system employs six wood-burning gas turbines. The exhaust gases from the turbines are passed through the boiler providing enough heat to operate at 75% of boiler capacity. The overall results are as follows: the net system output as retrofitted is 22,755 kW compared to current maximum output of 7500 kW; the overall efficiency of the combined system based on electrical output of the generators and higher heating value of the wood feed is 32.5%; the estimated cost of the system is $7,966,235 or $352 per installed kW not including land; and based upon use of Douglas fir and hemlock bark and wood mixture with heating value of 9840 Btu/lb and 40% moisture, 504 tons of wood waste per day will be required. DOE

N82-29488# Aerospace Research Corp., Roanoke, Va.
DEVELOPMENT OF WOOD AS AN ALTERNATIVE FUEL FOR LARGE POWER-GENERATING SYSTEMS. PART 3: COMPUTER SIMULATION OF THE DYNAMIC RESPONSE OF AN INDUSTRIAL GAS TURBINE WITH LARGE-VOLUME COMBUSTION AND FILTERING SYSTEM Final Report
Nancy A. Hamrick Sep. 1981 46 p refs
(Contract DE-AC05-78ET-20058)
(DE82-001997; DOE/ET-20058/T2-Pt-3) Avail: NTIS HC A03/MF A01

Computer simulations are presented for predicting the dynamic response of an industrial gas turbine generator set which includes a large burner and clean-up system for direct combustion of solid fuel. The transient response is determined for both design speed and start up. Results of the simulations can be used to determine necessary control system parameters. Initial simulations are discussed for the cases of a sudden major load increase or decrease and a moderately varying load at design speed, and for turbine start up including modified test bed running. The method should minimize control design time and safety risks during the development of the new turbine system. DOE

N82-29489# Aerospace Research Corp., Roanoke, Va.
DEVELOPMENT OF WOOD AS AN ALTERNATIVE FUEL FOR LARGE POWER-GENERATING SYSTEMS. PART 5: SOOT FORMATION IN SUSPENSION BURNERS Final Report
Perry L. Blackshear, Jr. (Minnesota Univ., Minneapolis) Jul. 1981 32 p refs
(Contract DE-AC05-78ET-20058)
(DE82-002032; DOE/ET-20058/T2-Pt-5) Avail: NTIS HC A03/MF A01

The mechanisms of soot formation in combustors that burn mixtures of wood particles and air are examined and changes in combustor design and operation that would result in greater combustion efficiency and decreased soot formation are discussed. DOE

N82-29490# Kansas Energy Office, Topeka. Energy Research and Resource Development Div.
PRODUCTION OF ALCOHOL FUELS VIA ACID HYDROLYSIS EXTRUSION TECHNOLOGY
Randall Noon and Thomas Hochstetler 1981 47 p refs
(DE82-901333; NP-2901333) Avail: NTIS HC A03/MF A01

Pilot plant data obtained using a modified single screw grain extruder to facilitate the conversion of raw cellulosic materials into fermentable monosaccharides via acid hydrolysis are analyzed. Cellulose availability and cost, cellulose conversion theory, cellulose conversion performance of extrusion technology, system analysis, and economics are discussed. DOE

N82-29491# Statens Rad foer Byggnadsforskning, Stockholm (Sweden).
BIOFUELS FOR HEATING: IN MUNICIPAL ENERGY PLANNING
Rune Hardell, Ulf Liljequist, Robert Schuster, and Lars Wester 1980 204 p refs In SWEDISH
(DE82-900677; SIB-R-102-1980) Avail: NTIS (US Sales Only) HC A10/MF A01; DOE Depository Libraries

A review of systems for harvesting, transporting, storing and firing such biofuels as wood, peat, straw and reed is presented. Cost, availability of the fuels and environmental effects are also treated. DOE

N82-29492# Studsvik Energiteknik A.B., Nykoping (Sweden). Research Center.
ASSESSMENT OF POTENTIAL FUTURE MARKET IN SWEDEN FOR HYDROGEN AS AN ENERGY CARRIER Final Report
Goeran Carleson Sep. 1980 382 p refs Sponsored in part by the International Energy Agency
(DE82-900643; NE/EPA-80/4) Avail: NTIS (US Sales Only) HC A17/MF A01; DOE Depository Libraries

Future hydrogen markets during the period 1980-2025 were projected. The probable range of hydrogen production costs were evaluated as well as the expected market shares in competition with alternative energy carriers. Three different energy scenarios were developed, based on nuclear energy, renewable indigenous energy sources and the present energy picture, respectively. Within each of the three scenarios, an analysis was made of the competitiveness of hydrogen on both the demand and the supply sides of the sectors: chemical industry, steel industry, peak power production, residential and commercial heating, and transportation. Costs were calculated for the production, storage and transmission of hydrogen. Health, enviromental and societal implications were taken into consideration. The results were used to estimate the market penetration of hydrogen. DOE

N82-30221 Atlantic Research Corp., Gainesville, Va.
NPP GRAIN DEFLECTION MODEL
J. W. Murray, A. J. Mikeska, and M. E. Tonkin *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 80-87 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/9

N82-30233 Hercules, Inc., McGregor, Tex.
RELATIONSHIPS AMONG SOLID PROPELLANT TEMPERATURE SENSITIVITY PARAMETERS
W. T. Brooks and R. R. Miller (Hercules, Inc., Cumberland, Md.) *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 287-295 ref (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/9

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N82-29493# Tennessee Technological Univ., Cookeville. Dept. of Chemical Engineering.
THE EFFECT OF VIBRATIONS ON THE DENSITY OF LOOSE-FILL INSULATIONS

D. W. Yarbrough and J. H. Wright Oak Ridge, Tenn. ORNL May 1981 37 p refs
(Contract W-7405-eng-26)
(ORNL/Sub-7715/3) Avail: NTIS HC A03/MF A01

The three major loose-fill insulation products marketed in this country were subjected to a variety of vibrations and impacts in a laboratory setting to determine the magnitude of the resultant density increases. Repeated drops of 19 mm (.75 inch) and 152 mm (6 inch) produced density increases of up to 75% for fiberglass, 45% for rock wool, and 27% for cellulosic materials. The three insulation products were also subjected to vibrations ranging from 0.1 mm (.004 inch) to 6.35 mm (.25 inch) to obtain ratios of final density over initial density. Under the test conditions studied it was observed that the lighter materials settled more percentagewise than the dense materials. Author

N82-29494# Harris Corp., Rochester, N. Y. PRD Electronics Div.
MM AND T PROGRAM TO ESTABLISH PRODUCTION TECHNIQUES FOR THE AUTOMATIC DETECTION AND QUALIFICATION OF TRACE ELEMENTS PRESENT IN THE PRODUCTION OF MICROWAVE SEMICONDUCTORS Final Report, 23 Aug. 1977 - 1 Mar. 1981
James D. Basile, Roy W. Spacie, and George P. Allendorf Mar. 1981 198 p refs
(Contract DAAB07-77-C-0561)
(AD-A113313; ECOM-0561-3) Avail: NTIS HC A09/MF A01 CSCL 13/8

Chemical contaminants in materials used in the production of microwave semiconductor diodes adversely affect the device yield. This report explores the relationship between chemical impurities in the solutions used in PIN diode manufacturing and the final yields. It also describes the applicability of spectral analysis technology to ascertaining critical chemical imbalances in the various reagents and solvents. A computer-controlled spectrometer was used to measure trace metals at each of 50 subprocesses in the PIN diode production. These measurements were amalgamated to comprise a database which was then subjected to detailed statistical analysis in an attempt to arrive at a specific relationship between chemical contamination and yield. No such relationship was discovered. The spectral analysis technology proved useful for diagnosing chemical contamination which affected production yield. Specific problems involved in the production process and the resolutions provided through use of spectrometry are discussed. Author (GRA)

N82-29495# SHE Corp., San Diego, Calif.
THE 4.0 K CRYOCOOLER PROJECT Annual Progress Report
Ronald E. Sager 30 Sep. 1981 59 p refs
(Contract DE-FC03-80ER-10692)
(DE82-007063; SHE-81-68003-1) Avail: NTIS HC A04/MF A01

Progress during the period October 1980 to October 1981 in the design and construction of a cryocooler to achieve temperatures down to 40 K is reported. Information is included on Stirling heat engine design, performance analysis, fabrication and initial testing; Dewar design; construction of a two stage cooler; and the design of a self loading helium loaded regenerator. DOE

N82-29496# Ames Lab., Iowa. Dept. of Chemical Engineering.
MATHEMATICAL MODEL FOR PREDICTING THE PARTICLE-SIZE DISTRIBUTION IN A BATCH ATTRITION-GRINDING PROCESS M.S. Thesis
Toan Huu Ngulyen Oct. 1981 112 p refs
(Contract W-7405-eng-82)
(DE82-005582; IS-T-976) Avail: NTIS HC A06/MF A01

The modified feed forward one Horst model predicts the particle size distribution in attrition grinding of Blomstrandine ore particles ranging in size from 1.4 to 600 microns. In predicting the particle size distribution (PSD), a material index alpha greater than or equal to 0 which describes the breakage property of the solid was determined. Two comminution coefficients and the size ratio of the respective sizes are needed to determine alpha. The modified model and graphical solution can be used to predict the PSD in other comminution processes. Production of the new surface was directly proportional to the size reduction energy up to 120 kW. The size reduction energy was calculated from the grinding time and the net shaft torque. At higher levels of input energy, production of new surface decreases. Plots of the new surface produced in sq m versus the size reduction energy (Wh) have two straight line portions with slopes of 1.166 and -0.111. DOE

N82-29497# Mid-American Solar Energy Complex, Minneapolis, Minn.
MASEC THERMAL-ANALYSIS WORKBOOK DESIGN HEATING LOAD AND SOLAR CONTRIBUTION: CALCULATION PROCEDURES
Sep. 1981 69 p refs
(Contract DE-AC02-79CS-30150)
(DE82-001751; MASEC-H-81-089; P-101-18) Avail: NTIS HC A04/MF A01

A method is provided to determine the hourly heat loss of a building under design conditions. To accomplish this, each part of the building shell must be analyzed and its heat loss calculated. Three energy analysis worksheets are provided to help facilitate the process. The first is used to determine U values and areas for above grade components of the building shell. Heat loss through below grade walls, below grade floors, and slabs on grade are figured on the second. Finally, transmission losses above grade, infiltration losses, and a total estimated design heating load are calculated on the third. A performance analysis technique based upon the solar savings fraction calculation method is designed to provide a detailed estimate of the energy requirements per heating season of a building with passive solar elements. The procedure is implemented by completing three worksheets. The first summarizes thermal specifications, calculated values and heating loads. The second is used to determine the amount of solar energy that is absorbed by the building per square foot of solar glazing. The third is used to find values of the monthly solar savings fraction and monthly and annual auxiliary heating requirement. Also calculated are annual passive solar contribution, passive solar fraction, and thermal integrity factor. DOE

N82-29498# Los Alamos Scientific Lab., N. Mex.
PASSIVE TEST-CELL EXPERIMENTS DURING THE WINTER OF 1979-1980
Jack C. Hyde Nov. 1981 40 p refs
(Contract W-7405-eng-36)
(DE82-007354; LA-9048-MS) Avail: NTIS HC A03/MF A01

The performance of a variety of passive solar heating configurations in 14 passive test cells were monitored. The cells included attached greenhouses, masonry and water walls with black-chrome absorber surfaces, night insulation, and phase-change thermal storage walls. The results of these side-by-side tests were used to make quantitative comparisons of the delivered performance of these configurations for the conditions under which they were tested. DOE

N82-29499# Kenneth Labs., New Haven, Conn. Undercurrent Design Research.
REGIONAL ANALYSIS OF GROUND AND ABOVE-GROUND CLIMATE
Oak Ridge, Tenn. ORNL Dec. 1981 199 p refs
(Contract W-7405-eng-26)
(DE82-007113; ORNL/SUB-81/40451/1) Avail: NTIS HC A09/MF A01

The regional suitability of underground construction as a climate control technique is discussed with reference to (1) a bioclimatic analysis of long term weather data for 29 locations in the United States to determine appropriate above ground climate control techniques, (2) a data base of synthesized ground temperatures for the coterminous United States, and (3) monthly dew point ground temperature comparisons for identifying the relative likelihood of condensation from one region to another. It is concluded that the suitability of Earth tempering as a practice and of specific Earth sheltered design stereotypes varies geographically; while the subsurface almost always provides a thermal advantage on its own terms when compared to above ground climatic data, it can, nonetheless, compromise the effectiveness of other, regionally more important climate control techniques. Reviews of above and below ground climate mapping

schemes related to human comfort and architectural design, and detailed description of a theoretical model of ground temperature, heat flow, and heat storage in the ground are included. Strategies of passive climate control are presented in a discussion of the building bioclimatic analysis procedure which has been applied in a computer analysis of 30 years of weather data for each of 20 locations in the United States. DOE

N82-29500# Federal Emergency Management Agency, Washington, D.C.

HIGH-RISE FIRE PROTECTION PROCEDURES

Dec. 1981 29 p refs

(PB82-153842; FEMA-12) Avail: NTIS HC A03/MF A01 CSCL 13M

A review of over 20 local high rise operating procedures is presented. Some of the important issues in high rise fire protection are reviewed in order to provide a basis for reviewing and developing high rise procedures at the local level. GRA

N82-29501# Federal Emergency Management Agency, Washington, D.C.

FIRE AND EMERGENCY MASTER PLANNING: SELECTED BIBLIOGRAPHY ON MASTER PLANNING Final Report

Nov. 1981 40 p refs

(PB82-153859; FEMA-15) Avail: NTIS HC A03/MF A01 CSCL 13L

An annotative bibliography on master planning was developed as a reference document to provide community elected officials, fire service managers, and master planning team members with sources of information on master planning. The master planning process is an analytical tool for evaluating past methods of providing fire protection, assessing the cost effectiveness of current fire protection and determining the best method of providing fire protection. Formally defined, master planning is a systematic approach for providing the highest level of protection at the least possible cost. This publication was designed to provide guidance information that enables the user to examine various benefits and aspects of master planning. The selected bibliography on master planning is divided into five major areas of concern to community leaders and fire service managers: master planning, management, prevention, suppression, and emergency response. GRA

N82-29502# National Bureau of Standards, Washington, D.C. National Engineering Lab.

FIELD MEASUREMENT OF BRANCH CIRCUIT WIRE TEMPERATURES

Thomas K. Falson Oct. 1981 45 p refs Sponsored in part by Dept. of Energy

(PB82-140252; NBSIR-81-2347) Avail: NTIS HC A03/MF A01 CSCL 13M

Temperature excursions of residential branch circuit wiring under field conditions were monitored to develop a field data base needed to determine the prevailing conditions in the field and to respond to various assertions that the encapsulation of branch circuit wiring within thermal insulation is a potential hazard. Previous laboratory investigations demonstrated that buried wires, when operated continuously at rated ampacity, will exceed the thermal limit established by the National Electrical Code (NEC). Approximately 2,800 circuits in 667 residences were monitored through a volunteer program with the utilities. The results show that slightly more than one-third of the circuits monitored operated at or above the thermal limit established by the NEC, 60 C (140 F). Thermal distributions are shown for variables such as: region, season, and age. GRA

N82-29503# National Bureau of Standards, Boulder, Colo. Fracture and Deformation Div.

J-INTEGRAL METHOD FOR FITNESS-FOR-SERVICE ASSESSMENT Interim Progress Report

D. T. Read and H. I. McHenry May 1981 53 p refs Sponsored in part by David Taylor Naval Ship Research and Development Center

(PB82-135195; NBSIR-81-1648) Avail: NTIS HC A04/MF A01 CSCL 13M

Development of a method for evaluation of material toughness requirements, allowable defect sizes, and sustainable stresses and strains is described. Yielding fracture mechanics and, specifically, the J integral are employed. The J integral is regarded as the crack driving force; applied J values above some critical value are predictive of material tearing. The applied J value is a function of applied stress and strain, crack length, and material tensile properties. The critical J integral value is measured in material fracture-toughness tests. The applied J integral is measured experimentally as a function of stress and strain in HY130 specimens with different crack lengths. GRA

N82-29504# National Bureau of Standards, Washington, D.C. National Engineering Lab.

SOLAR RADIATION AND ILLUMINATION Final Report

S. Treado and T. Kusuda Nov. 1981 35 p refs Sponsored by Navy, AF, Army and DOE

(PB82-135823; NBS-TN-1148) Avail: NTIS HC A03/MF A01 CSCL 13A

Experimental data were collected and analyzed under various cloud cover conditions to establish the relationship between solar irradiance and illuminance. Empirically derived equations are presented for estimating diffuse and total illuminance as a function of total and diffuse solar radiation. GRA

N82-29505# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.

AN EXPLICIT SOLUTION FOR THE GREEN FUNCTIONS FOR DYNAMIC LOADS IN LAYERED MEDIA

Eduardo Kausel May 1981 83 p refs

(PB82-147893; NSF/CEE-81060; Grant NSF PFR-80-12338) Avail: NTIS HC A05/MF A01 CSCL 08M

Solutions to elastodynamic problems of continua subjected to static and dynamic loads are reviewed and their value as tools is emphasized in solving involved boundary value problems arising in seismology and geomechanics. Ways to determine the response of a soil deposit to dynamic loads, caused either by a seismic excitation or by prescribed forces at some location in the soil mass, are discussed. That the loads must be resolved in terms of their temporal and spatial Fourier transforms is stressed. The stiffness matrix approach, an alternative method of analysis for layered soils, is explained. Green functions for ring loads, disk loads, point loads, and internal stresses are given. The Green functions for an arbitrarily layered stratum are evaluated by means of a computer program. An explicit, closed-form solution for the Green functions is presented. GRA

N82-29506# Building Systems Development, Inc., San Mateo, Calif.

BUILDING CONFIGURATION AND SEISMIC DESIGN: THE ARCHITECTURE OF EARTHQUAKE RESISTANCE

Christopher Arnold, Robert Reitherman, and Dianne Whitaker, ed. May 1981 286 p refs

(Grant NSF PFR-76-81821)

(PB82-158569; NSF/CEE-81064) Avail: NTIS HC A13/MF A01 CSCL 13M

The architecture of a building in relation to its ability to withstand earthquakes was determined. Aspects of round motion which are significant to building behavior are discussed. Results of a survey of configuration decisions that affect the performance of buildings with a focus on the architectural aspects of configuration design are provided. Configuration derivation, building type as it relates to seismic design, and seismic design, and seismic issues in the design process are examined. Case studies of the Veterans' Administration Hospital in Loma Linda, California, and the Imperial Hotel in Tokyo, Japan, are presented. The seismic design process is described paying special attention to the configuration issues. The need is stressed for guidelines, codes, and regulations to ensure design solutions that respect and balance the full range of architectural, engineering, and material influences on seismic hazards. GRA

N82-29507# District of Columbia Univ., Washington, D. C. Water Resources Research Center.

PHOTOSYNTHETIC PIGMENTS AS INDICATORS OF ALGAL ACTIVITY IN THE UPPER POTOMAC ESTUARY Final Report

Philip Sze Oct. 1981 26 p refs Prepared in cooperation with Georgetown Univ., Washington, D.C.

(Contract DI-14-34-0001-0109)

(PB82-157827; DC/WRRC/30; W82-02529;

OWRT-A-015-DC(1)) Avail: NTIS HC A03/MF A01 CSCL 13B

The Potomac River was monitored at Key Bridge from May - September, 1981. Temperature, major nutrients, photosynthetic pigments, abundance of major groups of photoplankton (direct counts), and potential photosynthetic production (oxygen method) were measured weekly in surface samples collected near mid-river. Chlorophyll A showed the same general trends as the cell counts and production with greatest algal activity in late May and August and a minimum in June. Centric diatoms and chlorococcalean green algae were the major planktonic algae in 1981, as in previous years. Overall, the activity of photoplankton did not show any significant change from previous years, and there was no evidence for prolonged nutrient depletion as a result of algal activity in the river. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

N82-29508 British Broadcasting Corp., Kingswood (England). Engineering Div.

CARFAX: THE EFFECTS OF CO-CHANNEL INTERFERENCE

M. E. Bailey May 1982 21 p refs

(BBC-RD-1982/5) Avail: British Broadcasting Corp., Kingswood Warren, Tadworth, Surrey, England

Subjective tests are performed to obtain further information concerning co-channel interference in 'CARFAX' and, in particular, to obtain protection ratios for the practical cases in which more than one interfering signal exists or in which an occasional interfering START or FINISH signal can be heard. The term 'protection ratio' is assumed to be the margin by which the wanted field-strength must (in planning the service) exceed the sum of the powers of the interfering field strengths considered, in any part of wanted service area. The term 'interference ratio' is used to denote the ratio by which the wanted field-strength exceeds the sum of the powers of the interfering field strengths considered, at a given geographical location. L.F.M.

N82-29509*# Axiomatix, Los Angeles, Calif.

RANGING/TRACKING SYSTEM FOR PROXIMITY OPERATIONS Final Report

Peter Nilsen and Sergei Udalov 3 Jun. 1982 65 p

(Contract NAS9-15666)

(NASA-CR-167636; NAS 1.26:167636; R8206-1) Avail: NTIS HC A04/MF A01 CSCL 17I

The hardware development and testing phase of a hand held radar for the ranging and tracking for Shuttle proximity operations are considered. The radar is to measure range to a 3 sigma accuracy of 1 m (3.28 ft) to a maximum range of 1850 m (6000 ft) and velocity to a 3 sigma accuracy of 0.03 m/s (0.1 ft/s). Size and weight are similar to hand held radars, frequently seen in use by motorcycle police officers. Meeting these goals for a target in free space was very difficult to obtain in the testing program; however, at a range of approximately 700 m, the 3 sigma range error was found to be 0.96 m. It is felt that much of this error is due to clutter in the test environment. As an example of the velocity accuracy, at a range of 450 m, a 3 sigma velocity error of 0.02 m/s was measured. The principles of the radar and recommended changes to its design are given. Analyses performed in support of the design process, the actual circuit diagrams, and the software listing are included. A.R.H.

N82-29510*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.

SYSTEM DATA COMMUNICATION STRUCTURES FOR ACTIVE-CONTROL TRANSPORT AIRCRAFT, VOLUME 1 Final Report

A. L. Hopkins, J. H. Martin, L. D. Brock, D. G. Jansson, S. Serben, T. B. Smith, and L. D. Hanley Jun. 1981 236 p refs 2 Vol.

(Contract NAS1-15359)

(NASA-CR-165773-Vol-1; NAS 1.26:165773-Vol-1; R-1469-Vol-1) Avail: NTIS HC A11/MF A01 CSCL 17B

Candidate data communication techniques are identified, including dedicated links, local buses, broadcast buses, multiplex buses, and mesh networks. The design methodology for mesh networks is then discussed, including network topology and node architecture. Several concepts of power distribution are reviewed, including current limiting and mesh networks for power. The technology issues of packaging, transmission media, and lightning are addressed, and, finally, the analysis tools developed to aid in the communication design process are described. There are special tools to analyze the reliability and connectivity of networks and more general reliability analysis tools for all types of systems. S.L.

N82-29511*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.

SYSTEM DATA COMMUNICATION STRUCTURES FOR ACTIVE-CONTROL TRANSPORT AIRCRAFT, VOLUME 2 Final Report

A. L. Hopkins, J. H. Martin, L. D. Brock, D. G. Jansson, S. Serben, T. B. Smith, and L. D. Hanley Jun. 1981 156 p refs 2 Vol.

(Contract NAS1-15359)

(NASA-CR-165773-Vol-2; NAS 1.26:165773-Vol-2; R-1469-Vol-2) Avail: NTIS HC A08/MF A01 CSCL 17B

The application of communication structures to advanced transport aircraft are addressed. First, a set of avionic functional requirements is established, and a baseline set of avionics equipment is defined that will meet the requirements. Three alternative configurations for this equipment are then identified that represent the evolution toward more dispersed systems. Candidate communication structures are proposed for each system configuration, and these are compared using trade off analyses; these analyses emphasize reliability but also address complexity. Multiplex buses are recognized as the likely near term choice with mesh networks being desirable for advanced, highly dispersed systems. S.L.

N82-29512*# Ohio State Univ., Columbus. ElectroScience Lab.

METEOROLOGICAL FACTORS IN EARTH-SATELLITE PROPAGATION Annual Report, 12 Mar. 1981 - 31 Mar. 1982

C. A. Levis, R. C. Taylor, R. Leonard, K. T. Lin, B. Pigon, and A. Weller Mar. 1982 56 p refs Prepared for JPL

(Contract JPL-956013)

(NASA-CR-169208; NAS 1.26:169208; ESL-713565-2) Avail: NTIS HC A04/MF A01 CSCL 20N

Using the COMSTAR D/4 28.56 GHz beacon as a source, a differential gain experiment was performed by connecting a 5-meter paraboloidal antenna and a 0.6-meter paraboloidal antenna alternately to the same receiver. Substantial differential gain changes were observed during some, but not all, rain events. A site-diversity experiment was implemented which consists of two 28.56 GHz radiometers separated by 9 km. The look-angle corresponds to that of the D/4 beacon, and data were obtained with one radiometer during several weeks of concurrent beacon operation to verify the system calibration. A theoretical study of the effect of scattering from a nonuniform rain distribution along the path is under way to aid in interpreting the results of this experiment. An improved empirical site diversity-gain model was derived from data in the literature relating to 34 diversity experiments. Work on the experiment control and data acquisition system is continuing with a view toward future experiments. Author

N82-29513*# Illinois Univ., Urbana. Aeronomy Lab.

A PREPROCESSOR FOR THE URBANA COHERENT-SCATTER RADAR

F. T. Zendt and S. A. Bowhill 1 Mar. 1982 120 p refs

(Grants NsG-7506; NSF ATM-78-21765)

(NASA-CR-169200; NAS 1.26:169200; ISSN-0568-0581; AERONOMY-102; UILU-ENG-82-2502) Avail: NTIS HC A06/MF A01 CSCL 17I

The design, interfacing, testing, and operation of a preprocessor to increase the altitude and temporal resolution of

the present coherent-scatter system are described. This system upgrade requires an increase in the data collection rate. Replacing the present, relatively slow, ADC with two high speed ADCs achieves the increased echo sampling rate desired. To stay within the capabilities of the main computer's I/O and processing rate the data must be reduced before transfer to the main computer. Thus the preprocessor also coherently integrates the data before transfer. A.R.H.

N82-29514# Electronic Space Systems Corp., Concord, Mass.
ELECTROMAGNETIC TEST FOR THE M10-76-8000 RADOME WITH XP PLATES Final Report
Aug. 1981 135 p
(Contract N00173-80-C-0345)
(AD-A107404; TR-81-8) Avail: NTIS HC A07/MF A01 CSCL 17/9

Contents: Transmission Loss; Sidelobe Perturbation; Beam Width Change; Antenna Beam Symmetry, and Boresight Error. Electromagnetic tests were conducted to evaluate the performance of the M10-76-8000 Radome fitted with special XP plates supplied by the Navy. The tests were run during the last two weeks of August, 1981. The type of tests, equipment employed, test setups and recorded data are contained in this report. This document also contains a list of all chart recordings and a copy of all recordings. GRA

N82-29515# Signal Technology, Inc., Santa Barbara, Calif.
ALGORITHM DEVELOPMENT OF A TELEPHONE SIGNAL CONDITIONER FOR THE WIDEBAND INTEGRATED NETWORK Final Report, 1 Jan. 1978 - 31 Dec. 1981
A. H. Gray, Jr. and D. M. Mansour 31 Dec. 1981 125 p refs
(Contract N00014-78-C-0214)
(AD-A112604) Avail: NTIS HC A06/MF A01 CSCL 17/2

During this program a full-scale testbed simulation of the interfacing of a telephone to the wideband integrated network was completed. This simulation includes the use of different types of echo cancelling algorithms and an LPC vocoder, and allows for other studies to be carried on. Echo cancelling algorithms were studied with a number of interesting conclusions. Because of the non-stationarity of the speech signals, made more so by the vocoder, standard LMS algorithms and lattice techniques are not adequate because of their convergence properties. With the vocoder in the loop, convergence must be faster than without the vocoder, because synthetic speech signals are not so rich in components as are the actual speech signals. An unconstrained frequency domain adaptive filter algorithm was the most effective. The echo cancelling is limited by the nonlinearities of the system. It was found that a nonlinear adaptive filter could reduce the signal-to-noise ratio by a few more dB when used with a stationary system (the hybrid and line characteristics remain fixed). The possible use of an AGC in the system was studied, and it was concluded that the AGC would cause more problems than it would help. GRA

N82-29516# Kanter (Irving), Lexington, Mass.
IMPROVING ANGULAR ACCURACY BY THRESHOLDING
Irving Kanter and Richard Roy Redstone Arsenal, Ala. Army Missile Command Aug. 1981 34 p
(Contract DAAG29-76-D-0100)
(AD-A113669; AD-E950225; DRSMI-RE-81-31-TR) Avail: NTIS HC A03/MF A01 CSCL 17/7

This paper presents the analysis of a signal processor that senses the phase front distortion across a monopulse antenna due to glint phenomena and rejects the consequent erroneous tracking data. The resulting glint reduction achieved by applying a combination of thresholds to the normalized sum channel signal and to the normalized imaginary component of the complex ratio D/S is presented. The results show that for a specified fraction of rejected data, maximum glint reduction is obtained by thresholding on sum channel information alone. Author (GRA)

N82-29517# University City Science Center, Philadelphia, Pa.
APPLICATIONS OF SELF-ORGANIZING RANDOM ARRAYS TO COMMUNICATION SATELLITES Final Technical Report, 1 Jul. 1980 - 20 Feb. 1981
Fred Haber, Yeheskel Bar-Ness, Bernard D. Steinberg, Paul Chien-Chang Yeh, and Judy Herman Griffiss AFB, N.Y. RADC Feb. 1982 122 p refs
(Contract F30602-80-C-0230; AF Proj. 4519)
(AD-A113381; RADC-TR-81-248) Avail: NTIS HC A06/MF A01 CSCL 20/14

The investigation of adaptive interference cancelling satellite-borne thinned arrays, capable of forming narrow beams in the direction of signal sources was performed. It was determined that an antenna configuration where the elements are placed in the form of a ring would be most appropriate for uniformity of the mainbeam pattern and for good beamwidth characteristics. However, satellite orientation and ground location uncertainty limit the pointing accuracy. Therefore, utilization of adaption algorithms which are able to work through these errors is required. It was concluded that by using this approach, the required performance can be achieved. Author (GRA)

N82-29518# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
DEVELOPMENT OF A PACKET SPEECH FUNNEL MULTIPLEXOR Final Report, 15 Jul. 1978 - 1 Jul. 1981
R. D. Rettberg May 1982 7 p refs
(Contract MDA903-78-C-0356; ARPA Order 3653)
(AD-A114480; BBN-4999) Avail: NTIS HC A02/MF A01 CSCL 17/2

This final report summarizes Quarterly Technical Reports 1 through 12 which describe the development of a high-speed interface, called a Voice Funnel, between digitized speech streams and a packet-switching communications network. Author (GRA)

N82-29519# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
CHARACTERISTICS OF A POWER LINE USED AS A VLF ANTENNA
Mitchell H. Dazey and Harry C. Koons 1 May 1982 41 p refs
(Contract F04701-81-C-0082)
(AD-A114959; TR-0082(2940-06)-5; SD-TR-82-22) Avail: NTIS HC A03/MF A01 CSCL 09/5

The 100-kW Transportable Very-Low-Frequency (TVLF) transmitter system was used at Kafjord, Norway, for transmissions to the SCATHA and GEOS spacecraft A 22 KV 10.6 km long transmission line was used as an antenna. Modifications were made in the line to reduce telephone interference. Components were designed and installed to reduce the resonant frequency and increase the antenna current. The final practical operating current was 45 amperes at 1280 Hz. This resulted in power dissipation of 72 kW and an estimated radiated power of 0.17 to 0.79 watts. Author (GRA)

N82-29520# Lincoln Lab., Mass. Inst. of Tech., Lexington.
MOVING TARGET DETECTOR (MOD 2)
David Karp and John R. Anderson 3 Nov. 1981 159 p refs
(Contracts DOT-FATQ-WAI-679; F19628-80-C-0002)
(AD-A114709; ATC-95; FAA-RD-80-77) Avail: NTIS HC A08/MF A01 CSCL 17/9

Under FAA sponsorship, MIT/Lincoln Laboratory has developed a second generation, field operable Moving Target Detection System (MTD-II) which has been tested at operational FAA terminal and enroute radar sites, and serves as the basis for the ASR-9 MTD technical performance specifications. This summary report covers the period October, 1976 through September, 1979 in which design, development, field testing and system performance evaluation were carried out. Report No. FAA-RD-76-190, ATC-69, 'Description and Performance Evaluation of the Moving Target Detector' dated 8 March 1977, serves as the technical foundation of this work. MTD-processing design modifications were effected to handle conditions of excessive ground clutter and moving ground traffic. The rationale for the modified algorithms is provided, and measured performance characteristics at several FAA field sites are discussed. Author (GRA)

N82-29521# George Washington Univ., Washington, D.C.
DYNAMIC TUNING OF A SIGNAL SORTER IN A DENSE ENVIRONMENT Final Report
A. M. Abdalla 10 Feb. 1982 119 p refs
(Contract N00014-80-C-0572)
(AD-A114524) Avail: NTIS HC A06/MF A01 CSCL 09/3

The purpose of the research was to study the application of

dynamic tuning, if practically feasible, to the design of a particular signal sorter in order to improve its performance. A simulation model of a signal sorter in a dense environment, which was studied and developed through work by the Advanced Techniques Branch of the TEW Division of the NRL was used for problem analysis. Signal sorting involves the correlation of the mass of signals detected by a receiver with the individual sources that generate each signal. Identification of particular emitters necessitates maintenance of a file to compare received pulses with those currently identified or known to be in a particular environment and to update when new emitters are detected in the environment. The signal sorter generates these files based on parameters measured by the receiver, such as direction-of-arrival (DOA), carrier-frequency, pulse-width and latest time-of-arrival, and generated parameters based on measured parameters, such as pulse-repetition-interval PRI. GRA

N82-29522# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.

ELECTROMAGNETIC COUPLING TO AN INFINITE WIRE THROUGH A SLOT IN A CONDUCTING PLANE

Yang Naiheng and Roger F. Harrington Mar. 1982 85 p refs (Contract N00014-76-C-0225)

(AD-A114824; TR-82-3; TR-15) Avail: NTIS HC A05/MF A01 CSCL 20/3

The problem of electromagnetic coupling through a slot-perforated conducting plane to an infinitely long wire is considered. It is treated as a boundary value problem and is formulated by use of the equivalence principle and image theory as a pair of coupled operator equations. The operator equations are solved simultaneously by means of the method of moments. The equivalent magnetic current on the slot and the electric current on the wire are obtained. The equivalent circuit seen by the transmission line mode on the wire is derived for the aperture-to-wire coupling system. Computer programs for solving this problem are presented and described. Some numerical examples are given and plotted. GRA

N82-29523# Argonne National Lab., Ill. Components Technology Div.

IMPROVED ENDOCHRONIC THEORY OF VISCOPLASTICITY AND ITS APPLICATION TO PLASTIC WAVE PROPAGATION

Hsuan-Chi Lin and Han-Chin Wu (Iowa Univ.) Oct. 1981 45 p refs

(Contract W-31-109-eng-38)

(DE82-011459; ANL-CT-81-37) Avail: NTIS HC A03/MF A01

The constitutive equations for strain hardening metallic materials with strain rate effects are presented in the framework of the endochronic theory of viscoplasticity using the improved intrinsic time measure. The derived constitutive c are then applied to the viscoplastic wave propagation problem of a thin walled tube subjected to impact loading. Numerical results using the improved endochronic time and theoretical results using conventional plasticity together with the experimental results are compared. In summary, the improved intrinsic time measure predict both loading and unloading behavior in accordance with the observed phenomena. DOE

N82-29524# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.

SIGNALS AND INTERFERENCE IN FM RECEPTION: 1: DETERMINISTIC MODELS: THE INSTANTANEOUS APPROACH, WITH UNDISTORTED INPUTS

David Middleton and A. D. Spaulding Oct. 1981 63 p refs (PB82-139262; NTIA/REPT-81-87) Avail: NTIS HC A04/MF A01 CSCL 17B

The purposes of this study (and subsequent efforts) are several: (1) to extend earlier models of the FM reception process, to include as much 'realism' - i.e., non-ideality of both the linear and nonlinear elements of the typical FM receiver - as possible, and still retain analytical and computational feasibility; (2) to examine explicit cases of interference produced by one or more deterministic signals; and (3) with such specific examples, both to provide insights into the distortion effects generated by the nonlinear interactions of the various (desired and undesired) signals in the receiver and to present the analytical framework of the instantaneous outputs required in any (subsequenty) fully statistical treatment, where now the interference (e.g., 'noise') is noticeably nongaussian. -In addition, these deterministic models may also provide useful structures for simulation studies. GRA

N82-29525# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.

THE ATTENUATION OF ELECTROMAGNETIC WAVES BY MULTIPLE KNIFE-EDGE DIFFRACTION

Lewis E. Vogler Oct. 1981 25 p refs

(PB82-139239; NTIA/REPT-81-86; NTIA/ITS-4) Avail: NTIS HC A02/MF A01 CSCL 20N

A multiple knife-edge attenuation function is derived. A series representation of the function is developed which is amenable to computer implementation. Comparisons of computer-generated numerical values with known results are presented and discussed. Author

N82-29526# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

REPORT ON THE SKYWAVE SEA-STATE-RADAR WORKSHOP

T. M. Georges and J. W. Maresca, Jr. (SRI International, Menlo Park, Calif.) Oct. 1981 34 p refs Workshop held in Rockville, Md., 20-22 May 1981

(PB82-160979; NOAA-TM-ERL-WPL-81; NOAA-81120701) Avail: NTIS HC A03/MF A01 CSCL 08C

HF skywave radar as an ocean remote sensor is discussed. Potential users of skywave radar services were invited to state their operational needs and to express candidly their views on where skywave radar might most profitably concentrate its future development effort. Author

N82-29527# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

ELECTROMAGNETIC PROPAGATION PROBLEMS IN THE TACTICAL ENVIRONMENT

Apr. 1982 155 p refs Lecture Series held in Munich, 3-4 May 1982 and Paris, 6-7 May 1982

(AGARD-LS-120; ISBN-92-835-1419-X) Avail: NTIS HC A08/MF A01

Propagation criteria affecting the performance of electronic equipment under battlefield conditions are discussed. For individual titles, see N82-29528 through N82-29537.

N82-29528# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

GENERAL REVIEW OF EM SPECTRUM CHARACTERISTICS IN TACTICAL APPLICATIONS

H. J. Albrecht *In its* Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 13 p refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

Characteristics of propagation media may have a more or less decisive influence upon the performance of systems used in any environment, and thus also in tactical applications. Atmospheric propagation media and their effects typically encountered in a tactical environment are summarized. In order to lead to and to supplement a more detailed treatment of particularly representative propagation conditions, features and limitations governed by the characteristics of media in various portions of the electromagnetic wave spectrum are considered. In addition to the discussion of the present state of the art, possible and feasible future development is addressed. J.D.

N82-29529# National Defence Headquarters, Ottawa (Ontario).

GROUND-WAVE PROPAGATION CHARACTERISTICS OF INTEREST TO THE TACTICAL COMMUNICATOR

F. H. Palmer *In* AGARD Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 p 16 refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

The effects of terrain and terrain cover on ground wave propagation at frequencies of interest to the tactical communicator are reviewed. Starting with the simplest case, that of free space propagation, complexities and subsequently added until most of

the factors which relate to path loss, path loss variability, and multipath effects are addressed. It is demonstrated that propagation prediction and the choice of appropriate models is as much an art as a science. J.D.

N82-29530# National Telecommunications and Information Administration, Boulder, Colo. Applied Electromagnetic Science Div.

PROPAGATION ASPECTS OF IONOSPHERIC LINKS OVER SHORT AND MEDIUM DISTANCES

Charles M. Rush *In* AGARD Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 15 p refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

Those aspects of ionospheric propagation that are pertinent to understanding, assessing, and predicting the performance of ionospheric-dependent radio links under tactical scenarios are described. Emphasis is given to those aspects of ionospheric propagation that compete for control of overall circuit performance: path geometry, signal loss, ionospheric structure and its variation with location and time, ionospheric parameters, and their relationship to circuit performance. The problems associated with predicting the performance of ionospheric links for long term planning purposes as well as for satisfying short term operational requirements are discussed. J.D.

N82-29531# Boston Univ., Mass. Dept. of Astronomy.

PROPAGATION CHARACTERISTICS OF SATELLITE LINKS

Jules Aarons *In* AGARD Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 28 p refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

Lower and upper atmospheric effects on signal characteristics of satellite transmissions are reviewed. The effects of importance produced by the ionosphere are the fading, caused by irregularities in the equatorial and high latitude ionospheres, the time delay errors produced by the passage of radiowaves through the ionospheric electrons, and absorption of the lower ionosphere at auroral and polar cap latitudes. The tropospheric effects include absorption by constituents and the problem of scattering of energy into unwanted polarizations. In some applications low angle effects of refraction and scintillation are also of importance.

Author

N82-29532# Siemens A.G., Munich (West Germany).

LIMITATIONS IN SCATTER PROPAGATION

Ernst W. Lampert *In* AGARD Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 11 p refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

A short description of the main scatter propagation mechanisms is presented; troposcatter, meteor burst communication and chaff scatter. For these propagation modes, in particular for troposcatter, the important specific limitations discussed are: link budget and resulting hardware consequences, diversity, mobility, information transfer and intermodulation and intersymbol interference, frequency range and future extension in frequency range for troposcatter, and compatibility with other services (EMC).

Author

N82-29533# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

INTRODUCTION TO PROPAGATION EFFECTS ON TYPICAL SYSTEMS

H. J. Albrecht *In its* Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 4 p refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

Depending on the actual application of a propagation path between two points, or within an area, a system may display particular behavior. In other words, its characteristics may be affected by certain propagation conditions. A general introduction to such effects is presented. Particular attention is paid to examples which allow the illustration of certain problems and possible remedies, and provide a basis for a more detailed discussion of propagation effects on typical systems. J.D.

N82-29534# North Atlantic Treaty Organization, Brussels (Belgium). Allied Radio Frequency Agency.

E.M. PROPAGATION PROBLEMS FOR TACTICAL RADIO RELAY SYSTEMS

T. K. Fitzsimons *In* AGARD Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 14 p refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

The designer or user of a tactical radio relay system is faced with a set of technical and operational problems that, for the most part, are not encountered by the designer of a fixed or non-tactical radio relay system. Although the EM propagation mechanisms for tactical and fixed systems are the same, since they both use the radio frequency spectrum from roughly 100 MHz up to tens of GHz, the problems of EM propagation manifest themselves in different ways and the considerations leading to equipment or system optimization are different. A tactical radio relay deployment is described and problems of siting the terminals are discussed. Propagation mechanisms such as refraction, reflection, diffraction, and fading are discussed and an assessment given of attenuation caused by rain. Statistical data based on field observations of a large tactical system are presented. Distributions of signal margin and link lengths are presented together with data on availability of line of sight paths. Different approaches to the prediction of performance are discussed, and likely trends in the use of higher frequency bands and the role of the computer assessed. J.D.

N82-29535# Royal Aircraft Establishment, Farnborough (England).

PROPAGATION PROBLEMS ASSOCIATED WITH AIRCRAFT COMMUNICATIONS SYSTEMS

B. Burgess *In* AGARD Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 10 p refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

Communications with mobiles is assuming increasing importance in a military context, with the advances in technology enabling not only greater amounts of information to be transferred, but also fostering a much harsher electromagnetic environment. The trend towards digital communications systems coupled with the possible demand for the wider bandwidths means that the propagation medium characteristics that influence the performance of these links are somewhat different from those that need to be addressed for narrowband analogue modulation transmissions. The various types of communications systems that are used with aeromobile platforms are reviewed and the various propagation problems that arise in achieving systems with good overall performance discussed. The links are conveniently divided into two types: beyond line of sight and line of sight systems, and span the frequency range from LF through to microwaves.

Author

N82-29536# Siemens A.G., Munich (West Germany).

SYSTEMS OF MULTIFUNCTION INFORMATION DISTRIBUTION AND FOR COMMAND, CONTROL AND COMMUNICATIONS-C3

E. W. Lampert *In* AGARD Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 8 p refs (For primary document see N82-29527 20-32)

Avail: NTIS HC A08/MF A01

The areas where communication systems in support of command, control, and communications (C3) are used are indicated along with the fundamental characteristics of those systems. Presently, C3 systems heavily rely on voice transmission. The future data processing environment requirements demand highly sophisticated digital C3 systems. In this area the multifunction information distribution system (MIDS) is the best developed system concept. The different features a MIDS can offer to the user are described. These are information transmission, navigation, and identification. These features impose certain requirements upon the propagation path which result in limitations in frequency range, signal, and equipment design of the system. The joint tactical information distribution system (JTIDS) with both variants TDMA and DTDMA and the systeme integre d'identification, de navigation, de trafic control, d'anticollision, de communication (SINTAC) are described as representative examples of MIDS. The points emphasized are link protocols and hardware implemen-

tation. The capabilities of these systems are checked against user requirements and the limits within which these general requirements can be fulfilled are shown. Author

N82-29537# Royal Signals and Radar Establishment, Malvern (England).
PROPAGATION EFFECTS IN TACTICAL RADARS
B. A. Prew *In* AGARD Electromagnetic Propagation Probl. in the Tactical Environ. Apr. 1982 11 p (For primary document see N82-29527 20-32)
Avail: NTIS HC A08/MF A01

Tactical battlefield radars are employed in surveillance and target acquisition roles at ranges of approximately 1 to 20 km, their main targets being enemy ground vehicles and personnel. As with all types of radar the operating environment has a significant effect on the design and performance of these systems and propagation considerations are an important factor. The major propagation factors which limit the performance of tactical radars are the availability of line of sight, ground clutter, and effects of the weather. The ways in which propagation factors affect the choice of such radar parameters as frequency, polarization, and RF waveform are discussed, and the ways in which propagation constraints can be minimised by the design of the signal processing system are considered. In an EW environment an important operational requirement is to minimize the probability of the location of the position of the radar by the enemy. Propagation effects such as multipath and diffraction are considered in broad terms in this context. Author

N82-30022# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).
A COMPARISON OF DIGITAL SUBSCRIBER LINE TRANSMISSION SYSTEMS EMPLOYING DIFFERENT LINE CODES
Alberto Brosio, Umberto DeJulio (Societa Italiana per l'Esercizio Telfonico, Rome), Vincenzo Lazzari, Renzo Ravaglia, and Adler Tofanelli *In its* Telecommun. Tech. Rept., Vol. 9, No. 6, Dec. 1981 p 591-598 refs Repr. from IEEE Trans. on Commun., v. Com-29, no. 11, Nov. 1981 (For primary document see N82-30018 20-70)
Avail: Issuing Activity

N82-30024# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).
DESIGN AND REALIZATION OF MULTIPLE-COUPLED DUAL MODE WAVEGUIDE FILTERS
Luciano Accatino and Roberto Salaroli *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 605-611 refs (For primary document see N82-30018 20-70)
Avail: Issuing Activity

N82-30025# Pontificia Universidade Catolica do Rio de Janeiro (Brazil).
PERFORMANCE ANALYSIS OF A DSI-ADPCM SYSTEM WITHOUT SPEECH DETECTORS
Jose Roberto BoissondeMarca, Maurizio Copperi (Centro Studi e Laboratori Telecommunicazioni), and Giancarlo Pirani (Centro Studi e Laboratori Telecommunicazioni) *In* Centro Studi e Laboratori Telecommunicazioni Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 613-616 refs (For primary document see N82-30018 20-70)
Avail: Issuing Activity

N82-30026# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).
AN APPROACH TO COMPUTE THE PERFORMANCE OF ROUTE DIVERSITY SYSTEMS AT FREQUENCIES ABOVE 10 GHz
Loris Stola *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 617-620 refs Presented at the 29th Convegno Intern. delleComunicazioni, Genoa, 6-9 Oct. 1981 (For primary document see N82-30018 20-70)
Avail: Issuing Activity

N82-30244*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SELECTION OF FREQUENCIES FOR DEEP-SPACE TELECOMMUNICATIONS
N. F. deGroot and M. K. Sue *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 49-61 refs Presented at the Meeting of the Space Frequency Coordination Group, Oberpfaffenhofen, West Germany, Oct. 1981 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 17B

N82-30245*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NEW CCIR PAPERS ON TELECOMMUNICATIONS FOR DEEP SPACE RESEARCH
N. F. deGroot *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 62-80 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 17B

N82-30246*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANALYSIS, PREDICTION AND CONTROL OF RADIO FREQUENCY INTERFERENCE WITH RESPECT TO DSN
N. F. deGroot *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 81-100 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 20N

N82-30248*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FIELD INTERFACE MODULE FOR ANTENNA CONTROL ASSEMBLY
F. Baher *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 107-112 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09C

N82-30250*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RECEIVER-EXCITER CONTROLLER DESIGN
P. A. Jansma *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 117-125 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09C

N82-30255*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
APPLICATON OF RADIATIVE TRANSFER THEORY TO MICROWAVE TRANSMISSION MEDIUM CALIBRATIONS
C. T. Stelzried *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 179-188 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 20N

N82-30256*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROVISION OF 9.6-kbps WIDEBAND DATA RATE CAPABILITY IN THE DSN
G. J. Brunder *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 189-193 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 20N

N82-30258*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GOLDSTONE RADIO SPECTRUM SIGNAL IDENTIFICATION, MARCH 1980 - MARCH 1982
B. A. Gaudian *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 197-199 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 17B

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N82-29538* National Aeronautics and Space Administration. Pasadena Office, Calif.

CONTROL MEANS FOR A SOLID STATE CROSSBAR SWITCH Patent

Tage O. Anderson (JPL, Pasadena, Calif.) and Alan M. Lovelace, inventors (to NASA) (JPL, Pasadena, Calif.) Issued 25 May 1982 9 p Filed 29 Sep. 1980 Supersedes N80-33679 (18 - 24, p 3273) Sponsored by NASA

(NASA-Case-NPO-15066-1; US-Patent-4,331,956; US-Patent-Appl-SN-191744; US-Patent-Class-340-825.89; US-Patent-Class-179-18GF; US-Patent-Class-370-67) Avail: US Patent and Trademark Office CSCL 09C

A control system for a solid state crossbar switch which allows a plurality of switch control and interrogation functions to be implemented by time sharing related circuitry is described. The crossbar switch includes a plurality of X ports and Y ports, each X-Y port intersection designating a specific X-Y intersection latch which controls a plurality of associated switches for interconnecting one set of data lines associated with the X port to another set of data lines associated with the Y port. The control system continuously and sequentially addresses each of the X-Y intersection latches at a 10 megahertz rate. During this addressing, the control circuitry includes a capability for interrogating each intersection latch for determining which are in a set condition, ensuring that only one X-Y intersection latch is set on an X row and Y column defining that latch, resetting all of the X-Y intersection latches, and determining which of the X-Y intersection latches are in a set condition.

Official Gazette of the U.S. Patent and Trademark Office

N82-29539* National Aeronautics and Space Administration. Pasadena Office, Calif.

DISCRIMINATOR AIDED PHASE LOCK ACQUISITION FOR SUPPRESSED CARRIER SIGNALS Patent

Lansing M. Carson (Motorola, Inc., Scottsdale, Ariz.) and F. Elvin Krasin, inventors (to NASA) (Motorola, Inc., Scottsdale, Ariz.) Issued 22 Jun. 1982 6 p Filed 15 Dec. 1978 Supersedes N79-14276 (17 - 05, p 0585) Sponsored by NASA

(NASA-Case-NPO-14311-1; US-Patent-4,336,616; US-Patent-Appl-SN-969762; US-Patent-Class-455-202; US-Patent-Class-455-208; US-Patent-Class-455-234; US-Patent-Class-455-306; US-Patent-Class-328-166) Avail: US Patent and Trademark Office CSCL 09C

A discriminator aided technique for acquisition of phase lock to a suppressed carrier signal utilizes a Costas loop which is initially operated open loop and control voltage for its VCXO is derived from a phase detector that compares the VCXO to a reference frequency thus establishing coarse frequency resolution with the received signal. Then the Costas loop is closed with the low-pass filter of the channel having a bandwidth much greater (by a factor of about 10) than in the I channel so that a frequency discriminator effect results to aid carrier resolution. Finally, after carrier acquisition, the Q-channel filter of the Costas loop is switched to a bandwidth substantially equal to that of the I-channel for carrier tracking.

Official Gazette of the U.S. Patent and Trademark Office

N82-29540# Materials Research Labs., Melbourne (Australia).

ELECTROMAGNETIC LAUNCHERS: BACKGROUND AND THE MRL PROGRAM

Yong-Chia Thio Mar. 1982 24 p refs Presented at the 6th Intern. Symp. in Ballistics, Orlando, Fla., 27-29 Oct. 1981; sponsored by the Am. Defense Preparedness Assoc.

(MRL-R-848; AR-002-758) Avail: NTIS HC A02/MF A01

Electromagnetic launchers are studied. These have potential applications in weaponry, controlled thermonuclear fusion, space launch, advanced industrial processes, equation of state research, generation of intense magnetic fields and as facilities for a wide range of studies in penetration mechanics, detonation, and warheads. S.L.

N82-29541*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

LSI/VLSI DESIGN FOR TESTABILITY ANALYSIS AND GENERAL APPROACH

Albert Y. Lam 1 Jun. 1982 141 p refs Sponsored by Naval Ocean Systems Center

(Contract NAS7-100)

(NASA-CR-169145; JPL-Publ-82-50; NAS 1.26:169145) Avail: NTIS HC A07/MF A01 CSCL 09C

The incorporation of testability characteristics into large scale digital design is not only necessary for, but also pertinent to effective device testing and enhancement of device reliability. There are at least three major DFT techniques, namely, the self checking, the LSSD, and the partitioning techniques, each of which can be incorporated into a logic design to achieve a specific set of testability and reliability requirements. Detailed analysis of the design theory, implementation, fault coverage, hardware requirements, application limitations, etc., of each of these techniques are also presented. S.L.

N82-29542# Department of Defense, Rock Island, Ill. Manufacturing Technology Advisory Group.

THE 1981 ELECTRONICS MINISYMPOSIUM PROCEEDINGS Annual Report, period ending 1981

Charles E. McBurney Dec. 1981 194 p refs Symp. held at San Diego, Calif., 2-3 Dec. 1981

(AD-A113956) Avail: NTIS HC A09/MF A01 CSCL 13/8

Proceedings of the Electronics Minisymposium held at San Diego on 2-3 December 1981 are published. Partial Contents Include: (1) Overview of Hybrid Microelectronic Activities and Thrust Area; (2) Elimination of Noble Metals in Hybrid Microcircuits; (3) Nickel Cadmium Battery Program; (4) Grid Wire Coating Machine for Power Grid Tubes; (5) Electronics Computer-Aided Manufacturing; (6) The Interactive Interconnection of Integrated Circuits; (7) A Radiation Hard CMOS/SOS Microprocessor Chip Set; (8) An Optical Direct Step on the Wafer System for Submicron Lithography; (9) A Description of New Manufacturing Technology for a High Power Traveling Wave Tube; (10) MM&T Program to Develop Advanced Methods for Fabricating Arsenic Selenide Glass, and (11) CO2 Waveguide Laser Manufacturing Technology. GRA

N82-29543# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronics and Technology/Devices Lab.

SUBTLE PERTURBATIONS AFFECTING QUARTZ RESONATORS USED FOR HIGH-STABILITY APPLICATIONS

Arthur Ballato, Theodore Lukaszek, and Gerald J. Iafrate Sep. 1981 83 p refs

(DA Proj. 1L1-62705-AH-94)

(AD-A112954; DELET-TR-81-19) Avail: NTIS HC A05/MF A01 CSCL 09/1

The quest for high stability crystal resonators for advanced frequency control applications has led very recently to a number of far reaching developments. As the level of frequency stability has improved over the years, various factors that were once imperceptible have become nonnegligible, and their influences have had to be eliminated, reduced, or compensated. At present, the most obvious contributors to resonator performance have been enumerated. It is important to continue to catalog less obvious effects, and to evaluate critically at what level their influences make an appearance in the error budget of the resonator. We consider a number of influences that are more or less subtle. Each is examined to see what contribution it makes to resonator performance. It is apparent that some have to be taken into account in present day applications; others may become important as future stability specifications become even more stringent.

Author (GRA)

N82-29544# Purdue Univ., Lafayette, Ind. Dept. of Computer Sciences.

PROCESSOR DISPLACEMENT: AN AREA-TIME TRADEOFF METHOD FOR VLSI DESIGN Interim Technical Report

David M. DeRuyck (Bell Telephone Labs., Naperville, Ill.), Lawrence

Snyder, and John D. Unruh (Bell Telephone Labs., Naperville, Ill.) Mar. 1982 22 p refs
(Contracts N00014-80-K-0816; N00014-81-K-0360)
(AD-A114706; CSD-TR-394) Avail: NTIS HC A02/MF A01; CSCL 09/5

Direct VLSI implementation of pipelined (systolic) processor arrays can lead to an over parallelized design causing the chip to have unused or underutilized area. Processor displacement design is a methodology that provides a spectrum of designs with differing time-area trade offs. The methodology is motivated, presented in detail, and illustrated by several examples. Direct experience for the Transitive Closure and Dynamic Programming systolic arrays is presented. Author (GRA)

N82-29545# Sediver, Inc., Carlstadt, N.J.
AC LINE INSULATORS Final Report
L. Pargamin Dec. 1981 184 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1206-1)
(DE82-901325; EPRI-EL-2151) Avail: NTIS HC A09/MF A01

The results of research and development work on the evaluation, optimization and use of composite insulators on HVDC lines are presented. Laboratory studies on small samples of the materials evidence new phenomena specific to dc-stress: permanent dry-band arcing causes higher erosions than under ac, and some ac nontracking materials track in dc. These effects, mainly thermal, are linked to arc-root fixation and electrochemical phenomena. Surface contamination depends upon material composition and electrode geometry. More conducting materials spread the contaminant more evenly but the overall deposit is increased (except for small clean areas near the electrodes). Deposit adhesion depends upon dry contamination/moisturization cycles. Similar effects were observed in the laboratory on small insulators. Contamination procedure is a major parameter and different tests give different rankings with respect to insulator flashover. For any test method, shed design is an important factor: flashover or withstand voltages can vary by a factor of 2 depending on the shape. A modified contamination test is proposed. DOE

N82-29546# Brookhaven National Lab., Upton, N. Y. Metallurgy and Materials Science Div.
SUPERCONDUCTING AND MECHANICAL PROPERTIES OF COLD HYDROSTATICALLY EXTRUDED MONOFILAMENTARY Nb3Sn WIRES
V. Thadani, T. Luhman, B. Avitzur, and Y. T. Chou 1981 8 p refs Prepared in cooperation with Lehigh Univ.
(Contract DE-AS02-79ER-10367)
(DE82-006573; DOE/ER-10367/5) Avail: NTIS HC A02/MF A01

A series of Nb3Sn monofilamentary wires wre prepared both by cold hydrostatic extrusion and wire drawing. The bronze to niobium ratios of these conductors varied from 2 to 18. A comparison between the two fabrication processes shows that hydrostatic extrusion shortens the manufacturing procedure. Strain tolerance of J/sub c/ at 4.20 K and 8T for the hydrostatically extruded wires compares favorably with the drawn material. The bronze niobium interface, the Nb3Sn growth rate and the microhardness of the constituents are also investigated. DOE

N82-29547# Ames Lab., Iowa.
DEVELOPMENT OF IN-SITU-FORMED Nb3Sn-Cu SUPERCONDUCTING WIRE Ph.D. Thesis
J. Sue Oct. 1981 80 p refs
(Contract W-7405-eng-82)
(DE82-005578; IS-T-973) Avail: NTIS HC A05/MF A01

Flux pinning and the optimization of J sub c properties were studied for in situ prepared Nb3Sn-Cu superconducting composite wire. The pinning force density is found to be a universal function of magnetic fields as F sub p porportional to h (1/2) (1-h)(2) over the full range of reduced field density, h, from h = 0.1 to h = 1.0. The experimental results for a wide range of microstructures show that J sub c is controlled by core pinning on surfaces of grain boundaries, and pinning by shear forces in flux line lattice at high fields is not important. The effective pinning area per unit volume calculated from theory is found to be equal to the area of the interfaces of Nb3Sn-Nb3Sn grain boundaries which are perpendicular to the filament axis. An attempt to increase J sub c properties in these wires is made by eliminating C impurities, optimizing as-drawn Nb filament size and alloying with the third element Ta. DOE

N82-29548# Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics.
FAST-SLOW COINCIDENCE SYSTEMS WITH VERY HIGH TIME RESOLUTION
I. Naday, Z. Kajcsos, Gy. Kozma, and M. Kanyo Feb. 1981 14 p refs In ENGLISH; HUNGARIAN summary Presented at the 10th Intern. Symp. on Nucl. Electron., Dresden, N.D.
(DE81-700541; KFKI-1981-11; ISSN-0368-5330; ISBN-963-371-788-4) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

The measuring of very short times recently became increasingly important. The authors describe their studies on the various parts of a timing system in an attempt to improve its parameters. The detector system, i.e. the transit time differences of the photomultipliers, the construction of the divider network, the various types of timing discriminators, the time-to-pulse height converters and the gating system were investigated. Two types of constant fraction discriminators are introduced: one for general timing applications, the other placed inside the detector head for positron lifetime measurements. DOE

N82-29549# Illinois Univ., Urbana. Dept. of Computer Science.
NUMERICAL SIMULATION OF SEMICONDUCTOR DEVICES M.S. Thesis
Sumantri Slamet Sep. 1981 53 p refs Sponsored in part by Indonesian Dept. of Education
(Contract DE-AS02-76ER-02383)
(DE82-005330; UIUCDCS-R-81-1072; UIUC-ENG-81-1722) Avail: NTIS HC A04/MF A01

An extension of Gummel's method to calculate the electron density and the potential in unipolar devices is presented. How Gummel's algorithm is implemented to solve the system of partial differential equations is explained. The current continuity equation is solved directly to obtain the electron density. Some comparisons with the stream function method to solve the current continuity equation are also discussed. It should be noted that the stream function method can only be used for time independent problems with no recombination or generation terms included, whereas the method described can be generalized to time dependent problems or problems with recombination and generation terms included. Numerical results for a standard MOSFET and JFET are given. DOE

N82-29550# Science Research Council, Chilton (England).
THREE DIMENSIONAL FIELD COMPUTATION
C. W. Trowbridge Jan. 1981 6 p refs
(DE82-700357; RL-81-054) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

Recent research work carried out on the computation of electromagnetic fields is summarized. Algorithms for integral and differential methods for the solution of 3D magnetostatic fields are presented and results compared with experiment. The strengths and weaknesses of both methods for an analytic problem are investigated. Work in progress on the solution of 3D eddy currents using differential finite elements is summarized. DOE

N82-29551# Los Alamos Scientific Lab., N. Mex.
CURRENT DISTRIBUTION AND INDUCTANCE CALCULATIONS FOR RAIL-GUN CONDUCTORS
J. F. Kerrisk Nov. 1981 20 p refs
(Contract W-7405-eng-36)
(DE82-007033; LA-9092-MS) Avail: NTIS HC A02/MF A01

A method for calculation of the current density distribution, magnetic field, and inductance of railgun or flux compression generator rails, or other long, parallel conductors of arbitrary cross section, in the high frequency limit is described. The results represent initial estimates of these quantities in railgun circuits before current or magnetic field diffusion has significantly changed the current distribution. The numerical procedure determines the current density distribution using an existing technique originally developed for calculation of charge distribution on equipotential surfaces. The inductance and magnetic field are calculated from

the current distribution. Calculations were performed for four systems: two cylindrical conductors, two rectangular conductors, two rectangular conductors in a tube, and flux compression generators used at Los Alamos National Laboratory. Inductances of two rectangular conductors and of flux compression generators were fitted to empirical equations to simplify their further use. Calculated current distributions and inductances were compared with other theoretical calculations and with measured data. The comparisons indicate that results from this method accurately predict the current density distribution and inductance of these systems in the high frequency limit. DOE

N82-29552# Oak Ridge National Lab., Tenn. Computer Sciences Div.
MAGNETIC FIELD, VECTOR POTENTIAL, AND THEIR PARTIAL DERIVATIVES DUE TO A CURRENT-CARRYING STRAIGHT WIRE OF FINITES LENGTH
D. K. Lee Dec. 1981 31 p refs
(Contract W-7405-eng-26)
(DE82-007130; ORNL/CSD/TM-146) Avail: NTIS HC A03/MF A01

A numerical study is made of a problem dealing with calculation of the magnetic field B vector, the magnetic vector potential A vector, and first partial derivatives of the B vector field and A vector components for two kinds of magnetic sources: (1) current-carrying straight wire of finite length; and (2) current-carrying closed polygon. No restrictions are imposed on the type of the polygon and hence it need not be plane and can consist of an arbitrary number of straight wires of arbitrary lengths. Separate consideration of the polygon case makes the numerical procedures more efficient than that based on the linear superposition of the straight-wire sources. All necessary quantities are derived analytically in simple and closed forms without use of any approximations and exact relations are utilized to the greatest possible extent to give an efficient algorithm. Thus, the involved numerical procedures are quite simple, fast, accurate, and straightforward. Results are given in four different coordinate systems (cartesian, cylindrical, spherical, and local toroidal). DOE

N82-29553# National Bureau of Standards, Washington, D.C.
CORROSION EVALUATION OF UNDERGROUND TELEPHONE CABLE SHIELDING MATERIALS Progress Report, 1975 - 1980
W. F. Gerhold and J. L. Fink Apr. 1981 77 p refs Sponsored in part by Dept. of Agriculture
(PB82-135187; NBSIR-81-2243) Avail: NTIS HC A05/MF A01 CSCL 09A

Corrosion data is given on the performance of base and plastic coated metals intended for use as cable shields for buried telephone cable. The materials investigated on specially prepared specimens were buried for periods up to six years in six different soil environments. Metals tested included homogeneous plastic-bonded and metallurgically-bonded laminates. Some specimens were exposed bare (uncoated), while others had plastic coatings or other types of coatings on either one or both sides. Metals studied included aluminum, copper, low carbon steel and stainless steel alloys. GRA

N82-29554# National Bureau of Standards, Washington, D.C.
TECHNICAL ASSISTANCE FOR FUTURE INSULATION SYSTEMS RESEARCH, 1980 Annual Report
R. J. VanBrunt, M. Misakian, D. A. Leep, K. J. Moy, and E. C. Beaty Apr. 1981 106 p refs Sponsored in part by DOE
(PB82-134354; NBSIR-81-2242) Avail: NTIS HC A06/MF A01 CSCL 09A

An experimental technique was developed to quantify the electrical characteristics of pulse-type partial discharges (corona) in compressed electronegative gases. By this method the pulse repetition rates, shapes, and height distributions are determined together with the average current. The technique was applied to the investigation of corona behavior in compressed SF6 and SF6/N2 for both dc and 60-Hz ac voltages. A gas chromatograph-mass spectrometer was employed to monitor production of trace contaminants by corona-induced degradation of SF6. The most abundant gaseous by-products that were detected from dc corona were H2O, SOF2, and SO2F2. GRA

N82-30239*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ORION DOWNCONVERTER AND POWER SUPPLY
H. G. Nishimura *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 3-9 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09C

N82-30253*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A NEW HIGH-POWER KLYSTRON FOR THE DSN
A. Goldfinger (Varian Associates, Inc.), M. A. Gregg, and R. Hartop *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 157-173 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09A

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N82-29555# Syracuse Univ., N. Y. Dept. of Physics.
COMPUTER ENHANCED ANALYSIS OF A JET IN A CROSS-STREAM
John W. Trischka and Nancy J. Birkenheuer (Midwest Research Inst., Golden, Colo.) 22 Feb. 1982 41 p refs Backup document for AIAA synoptic scheduled for publication in the AIAA Journal, Feb. 1983
Avail: NTIS HC A03/MF A01

Previously analyzed velocity data for a jet in a wind tunnel cross stream was used in a computer analysis which, through interpolation and extrapolation, produced velocity and vorticity fields on a uniform, three dimensional grid. Microfilm output from the computer displayed isopleths on sets of planes in three orthogonal directions. Improved determinations were made of the jet center line, of the center lines of the bound vortices and of the jet boundaries. Stationary waves were discovered in the mixing region on the upstream side of the jet. An explanation for these waves is proposed. The angle between vorticity and velocity is used to compare the flow with complex lamellar and Beltrami flows. A convergence feature in the jet wake is noted. Author

N82-29556*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CORRELATION OF PRESTON-TUBE DATA WITH LAMINAR SKIN FRICTION (LOG NO. J12984)
T. D. Reed (Oklahoma State Univ., Stillwater), A. Abu-Mostafa (Oklahoma State Univ., Stillwater), and F. W. Steinle, Jr. 18 Jan. 1982 37 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Feb. 1983
(Grants NSG-2396; NAG2-76)
(NASA-TM-84827; NAS 1.15:84827; Log-J12984) Avail: NTIS HC A03/MF A01 CSCL 20D

Preston tube data within laminar boundary layers obtained on a sharp ten-degree cone in the NASA Ames eleven-foot transonic wind tunnel are correlated with the corresponding values of theoretical skin friction. Data were obtained over a Mach number range of 0.30 to 0.95 and unit Reynolds numbers of 9.84, 13.1, and 16.4 million per meter. The rms scatter of skin friction coefficient about the correlation is of the order of one percent, which is comparable to the reported accuracy for calibrations of Preston tubes in incompressible pipe flows. In contrast to previous works on Preston tube/skin friction correlations, which are based on the physical height of the probe's face, this satisfactory correlation for compressible boundary layer flows is achieved by accounting for the effects of a variable 'effective' height of the probe. The coefficients, which appear in the correlation, are dependent on the particular tunnel environment. The general procedure can be used to define correlations for other wind tunnels. Author

N82-29557# Rockwell International Science Center, Thousand Oaks, Calif.
A STUDY OF WALL JETS AND TANGENTIALLY BLOWN WINGS Final Report, 1 Jan. 1976 - 31 Mar. 1981
N. D. Malmuth, W. D. Murphy, and J. D. Cole (California Univ., Los Angeles) Jul. 1981 175 p refs
(Contract N00014-76-C-0350; NR Proj. 061-234)
(SC5055.21FR) Avail: NTIS HC A08/MF A01

Transonic wall jets and tangentially blown wings were studied using symptotic and computational methods. Both submerged and coflowing cases of wall jets were investigated. The nature of the decay process for disturbances emanating from the jet exit was examined for the submerged configurations. In the coflowing case, selection rules defining various jet flow regimes in terms of the jet transonic similarity parameter and pressure level are given. Conditions are prescribed which define the penetration length for supersonic disturbances downstream from the exit as well as the location of the throats in the jet. The criticality of the flow far downstream is quantified in terms of these parameters. Models of the complete problem for a tangentially blown airfoil in incompressible and transonic are described. A systematic theory based on matched asymptotic expansions for the fine structure of the jets away from their exits is developed. The effects of initial skewness and vorticity are assessed. The trailing edge region of the blown airfoil was also studied. A finite difference model which characterizes the development of blown laminar boundary layers and wakes in the transonic regime is presented. J.D.

N82-29558*# Missouri Univ., Rolla. Dept. of Mechanical and Aerospace Engineering.
EFFECT OF A FINITE IONIZATION RATE ON THE RADIATIVE HEATING OF OUTER PLANET ATMOSPHERIC ENTRY PROBES Final Report
H. F. Nelson Washington NASA Jun. 1982 69 p refs
(Grant NAG1-125)
(NASA-CR-3577; NAS 1.26:3577) Avail: NTIS HC A04/MF A01 CSCL 20D

The influence of finite rate ionization in the inviscid gas just behind the stagnation shock wave on the radiative heating of probes entering the hydrogen-helium atmosphere of the major plants was investigated. Two opposing conclusions were reached as to how the ionization rate assumption affects the radiative transfer. Hydrogen-helium shock waves with a cold nonblowing wall boundary condition at the probe heat shield are emphasized. The study is limited to the stagnation shock layer. S.L.

N82-29559*# Old Dominion Univ., Norfolk, Va. Dept. of Mathematical Sciences.
BURGERS APPROXIMATION FOR TWO-DIMENSIONAL FLOW PAST AN ELLIPSE Final Report, 26 May 1981 - 25 May 1982
J. Mark Dorrepaal Jul. 1982 46 p refs
(Grant NAG1-197)
(NASA-CR-169155; NAS 1.26:169155) Avail: NTIS HC A03/MF A01 CSCL 20D

A linearization of the Navier-Stokes equation due to Burgers in which vorticity is transported by the velocity field corresponding to continuous potential flow is examined. The governing equations are solved exactly for the two dimensional steady flow past an ellipse of arbitrary aspect ratio. The requirement of no slip along the surface of the ellipse results in an infinite algebraic system of linear equations for coefficients appearing in the solution. The system is truncated at a point which gives reliable results for Reynolds numbers R in the range $0 < R < 5$. Predictions of the Burgers approximation regarding separation, drag and boundary layer behavior are investigated. In particular, Burgers linearization gives drag coefficients which are closer to observed experimental values than those obtained from Oseen's approximation. In the special case of flow past a circular cylinder, Burgers approximation predicts a boundary layer whose thickness is roughly proportional to $R-1/2$. S.L.

N82-29560*# Tennessee Univ. Space Inst., Tullahoma.
THEORETICAL ANALYSES OF BAROCLINIC FLOWS Quarterly Report, 1 Aug. 1981 - 31 May 1982
Basil Antar 24 May 1982 91 p refs
(Contract NAS8-33386)
(NASA-CR-162048; NAS 1.26:162048; QR-5-7) Avail: NTIS HC A05/MF A01 CSCL 20D

A stability analysis of a thin horizontal rotating fluid layer which is subjected to arbitrary horizontal and vertical temperature gradients is presented. The basic state is a nonlinear Hadley cell which contains both Ekman and thermal boundary layers; it is given in closed form. The stability analysis is based on the linearized Navier-Stokes equations, and zonally symmetric perturbations in the form of waves propagating in the meridional direction are considered. Numerical methods were used for the stability problem. It was found that the instability sets in when the Richardson number is close to unity and that the critical Richardson number is a non-monotonic function of the Prandtl number. Further, it was found that the critical Richardson number decreases with increasing Ekman number until a critical value of the Ekman number is reached beyond which the fluid is stable. Author

N82-29561# Chase (David M.), Inc., Boston, Mass.
FURTHER MODELING OF TURBULENT WALL PRESSURE ON A CYLINDER AND ITS SCALING WITH DIAMETER
David M. Chase 19 Dec. 1981 48 p refs
(Contract N00014-80-C-0370)
(AD-A113820; TM-21) Avail: NTIS HC A03/MF A01 CSCL 20/4

The possible scaling of the axisymmetric component of spectral density of wall pressure in turbulent flow along a slender cylinder is reexamined with use of a formal low-wave number expansion in terms of fluctuating Reynolds stresses as sources. A rudimentary model of the sources is formed that conforms to the principle of local similarity near the wall and to probable implications of fluctuating and mean velocity profiles measured in cylindrical boundary layers. To the extent that wall pressure is exclusively due to such a turbulence field, to zero order in wave number, at least, it is indicated to scale with cylinder radius (a) and to agree in functional dependence with the current model for this low-wavenumber component. If the turbulence field (despite lack of experimental evidence) involves in addition a weak component that scales with boundary-layer thickness, then at sufficiently low frequencies and wave numbers the corresponding contribution to wall pressure (when $\delta/a >> 1$) may become dominant, and the extrapolation of the current model to very small omega a/U(Infinity) and the associated prediction of diameter dependence may then fail. GRA

N82-29562# Aeronautical Research Inst. of Sweden, Stockholm.
INVESTIGATION OF MODELING CONCEPTS FOR PLUME-AFTERBODY FLOW INTERACTIONS Final Technical Report, Jan. 1978 - Apr. 1981
Sven-Erik Nyberg and Johan Agrell Nov. 1981 80 p refs
(Grant DA-ERO-78-G-028; DA Proj. 1T1-61102-BH-57)
(AD-A114516; FFA-TN-AU-1384) Avail: NTIS HC A05/MF A01 CSCL 20/4

A high pressure hot gas supply system has been developed for the 0.5 x 0.5 sq. meters S5 wind tunnel to allow the study of aerodynamic interference effects caused by plume induced separation from propulsive afterbodies. Capable of operating with a variety of gases covering a wide range of specific heat ratios, the facility allows to evaluate the merits and potential of a new plume simulation methodology. Experimental programs carried out with air and Freon-22 for the jet simulation confirmed the correctness of the theory. The accuracy of the modeling extended over wide ranges of jet-to-ambient pressure ratios straddling the design points. Limited tests at small angles of attack (-6 deg $<$ or equal alpha $<$ or equal $+6$ deg) and with external disturbances in the vicinity of the base plane (fins) appear to support the applicability of the modeling scheme for more complex flow field geometries. Beyond the ability to correctly model and interpret near wake pressures and slipstream separation locations, the new methodology allows experiments to be conducted with diatomic gases (air or nitrogen, gamma equal 1.4) at much lower stagnation pressures as would be required for propellants of lower specific heat ratios. GRA

N82-29563# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
ON THE PASSAGE OF A SHOCK WAVE THROUGH A DUSTY-GAS LAYER

H. Miura and I. I. Glass Jan. 1982 23 p refs
(Grant AF-AFOSR-3303-77)
(AD-A114808; UTIAS-252; AFOSR-82-0374TR) Avail: NTIS HC A02/MF A01 CSCL 20/14

The flow resulting from the passage of a shock wave through a dusty-air layer is studied analytically and numerically. For the cases treated here, a shock wave is always reflected at the first contact surface separating the pure gas from the dusty layer and a shock wave is transmitted into the dusty layer. The transmitted shock wave is stronger. The criteria for the reflected wave in terms of the properties of the air and dusty layer are obtained based on an idealized equilibrium-gas approximation. Working curves are presented showing the effects of the suspended particles on the resulting flow. Similarly, at the second contact front of the dusty layer, a rarefaction wave is reflected and the transmitted shock wave transmitted into the air is weakened by this nonlinear interaction. The rarefaction wave reflects at the first contact front as a compression wave and proceeds through the layer to refract at the second contact surface where it reflects as a rarefaction wave and a transmitted compression wave. GRA

N82-29564# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
INTERACTION OF OBLIQUE SHOCK AND DETONATION WAVES Interim Technical Report
Y. Sheng Feb. 1982 48 p refs
(Grant AF-AFOSR-3303-77; AF Proj. 2307)
(AD-A114778; UTIAS-TN-235; AFOSR-82-0372TR) Avail: NTIS HC A03/MF A01 CSCL 21/2

The interaction of an oblique shock wave and an oblique detonation wave which deflect the flow in the same direction is analyzed. The detonation wave is assumed to be an exothermic gasdynamic discontinuity. A criterion is developed and used to determine whether or not a theoretical solution of the problem describes a physically realizable interaction configuration. It is found that the reflected wave is, in general, a rarefaction wave. Only for very low values of the heat release parameter of the detonation wave the reflected wave has been found to be a shock wave. Domains of existence of such resulting wave interaction configurations are established for different values of the oncoming Mach number, 6 less than or equal M less than or equal 8, the heat release parameter, 3 less than or equal Q less than or equal 8, and the specific heat ratios for the combustion products behind the detonation wave, 1.30 less than or equal gamma less than or equal 1.33. It is also found that double discontinuity configurations, representing the refraction of a detonation wave at a combustible/non-combustible interface (a limiting case of the considered interaction problem) can exist for certain values of the flow parameters involved and for different specific heat ratios of the gases in front of and behind the detonation wave. The magnitudes of the heat release parameter and specific heat ratio of the combustion products affect significantly the interaction pattern of shock and detonation waves. It is, concluded that the interaction problem considered be based on a detailed thermochemical analysis for given combustible mixtures of gases. Author (GRA)

N82-29565# Lehigh Univ., Bethlehem, Pa.
BALLISTIC OF SHELLS CONTAINING A VISCOELASTIC FLUID Final Report, 15 Mar. 1979 - 30 Apr. 1982
R. S. Rivlin Jun. 1982 9 p refs
(Contract DAAG29-79-C-0058)
(AD-A114989; ARO-16280.4-EG) Avail: NTIS HC A02/MF A01 CSCL 20/4

Work has been carried out on the problems of run-up and spin-up in a viscoelastic fluid. Three simple problems have been considered. These are: (1) the fluid is confined between two infinite rigid parallel plates. These are simultaneously and instantaneously given equal velocities, which are then maintained constant. The resulting velocity field of the fluid is calculated as a function of time. (2) The fluid is contained in a rigid circular cylinder of infinite length. At some instant the cylinder is given a longitudinal velocity which is subsequently held constant. The resulting velocity field in the fluid is calculated as a function of time. (3) The rigid containing cylinder is, at some instant, given an angular velocity which is subsequently held constant. The resulting angular velocity field in the fluid is calculated. GRA

N82-29566# Garrett Corp., Phoenix, Ariz.
DESIGN GUIDE FOR LAMINAR FLOW FLUIDIC AMPLIFIERS AND SENSORS Contractor Report, Oct. 1980 - Oct. 1981
M. F. Cycon, Jr. and D. J. Schaffer 27 Apr. 1982 148 p refs
(Contract N00019-78-G-0288; DA Proj. 1L1-62120-AH-25)
(AD-A114799; Rept-41-3228A; HDL-CR-288-1) Avail: NTIS HC A07/MF A01 CSCL 09/5

This final report provides technical information on the design, performance, and fabrication of laminar amplifiers and sensors. Standard amplifier designs and formats are presented which allow the user to select amplifier characteristics most suitable for each specific application. Various methods for fabrication of elements are described and information relating to the effects of fabrication inaccuracies are presented in this report. The laminar jet angular rate sensor is described and the advantages of applying laminar fluidics to the vast field of sensors is shown. Several circuit arrangements and the performance achieved with these circuits are presented. Charts and other reference material are also included. Author (GRA)

N82-29567# Wisconsin Univ., Madison. Mathematics Research Center.
MATHEMATICAL MODELING OF TWO-PHASE FLOW Technical Summary Report
D. A. Drew Mar. 1982 55 p refs
(Contract DAAG29-80-C-0041)
(AD-A114535; MRC-TSR-2343) Avail: NTIS HC A04/MF A01 CSCL 12/1

A continuum mechanics approach to two-phase flow is reviewed. An averaging procedure is discussed and applied to the exact equations of motion. Constitutive equations are supplied and discussed for the stresses, pressure differences and the interfacial force. The nature of the resulting equations is studied. Author (GRA)

N82-29568# Wisconsin Univ., Madison. Mathematics Research Center.
BUBBLE IN A CORNER FLOW Technical Summary Report
Jean-Marc Vanden-Broeck Jan. 1982 18 p refs
(Contract DAAG29-80-C-0041; Grant NSF MCS-79-27062)
(AD-A114527; MRC-TSR-2324) Avail: NTIS HC A02/MF A01 CSCL 20/4

The distortion of a two dimensional bubble (or drop) in a corner of angle delta, due to the flow of an inviscid incompressible fluid around it, is examined theoretically. The flow and the bubble shape are determined as functions of the angle delta, the contact angle beta and the cavitation number gamma. The problem is formulated as an integrodifferential equation for the bubble surface. This equation generalizes the integrodifferential equations derived by VandenBroeck and Keller. The shape of the bubble is found approximately by using the slender body theory for bubbles presented by Vanden-Broeck and Keller. When gamma reaches a critical value gamma sub 0 (beta, delta), opposite sides of the bubble touch each other. Two different families of solution for gamma < gamma sub 0 are obtained. In the first family opposite sides touch at one point. In the second family contact is allowed along a segment. The methods used to calculate these two families are similar to the ones used by Vanden-Broeck and Keller and Vanden-Broeck. GRA

N82-29569# Argonne National Lab., Ill. Components Technology Div.
DOE/ANL/HTRI HEAT-EXCHANGER TUBE-VIBRATION DATA BANK (ADDENDUM 2)
H. Halle, J. M. Chenoweth (Heat Transfer Research, Inc., Alhambra, Calif.), and M. W. Wambsganss Nov. 1981 50 p refs
(Contract W-31-109-eng-38)
(DE82-010490; ANL-CT-80-3-Add-2) Avail: NTIS HC A03/MF A01

This second addendum heat exchanger tube vibration data bank presents 10 case histories of field experiences. The data bank was established to accumulate comprehensive case histories on heat exchangers that have experienced tube vibration problems and on units that have been trouble free, and to render this information available for evaluation, improvement, and development of vibration prediction methods and design guidelines. DOE

N82-29570# Los Alamos Scientific Lab., N. Mex.
TWO-AND THREE-DIMENSIONAL DETONATION WAVE INTERACTIONS WITH A COPPER PLATE
C. L. Mader and J. D. Kershner Nov. 1981 18 p refs
(Contract W-7405-eng-36)
(DE82-007355; LA-8989) Avail: NTIS HC A02/MF A01

The effect of multipoint initiation of an explosive on the motion of a thin metal plate is investigated in two and three dimensional geometry. The interactions of two cylindrically diverging detonations and four spherically diverging detonations with thin metal plates are described. DOE

N82-29571# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
SCALE EFFECTS IN LIQUEFIED-FUEL-GAS VAPOR DISPERSION Final Technical Report
James A. Fay and Dale Ranck 30 Sep. 1981 98 p refs
(Contract DE-AC02-77EV-04204)
(DE82-006245; DOE/EV-04204/5) Avail: NTIS HC A05/MF A01

A generalized framework for comparing experimental observations of dense cloud behavior and, ultimately, for comparing the predictions of mathematical models with the experimental data is proposed. The dual bases of this framework are the definition of dimensionless variables and the use of a simple entrainment model to depict the expected relationships among the dimensionless variables. To test the usefulness of this methodology, all the available data from wind tunnel and field tests were correlated in accordance with the proposed scheme. DOE

N82-29572# Calspan Corp., Buffalo, N. Y. Aerodynamic Research Dept.
PROJECT VULCAN: THE DEVELOPMENT OF A GASDYNAMIC HEATER. VOLUME 3: DIAGNOSTIC REQUIREMENTS
R. F. Drzewiecki, W. J. Rae, and A. L. Russo Aug. 1981 25 p refs 3 Vol.
(Contract W-7405-eng-48)
(DE82-006787; UCRL-15416-Vol-3; CALSPAN-6396-A-1) Avail: NTIS HC A02/MF A01

The technical effort during June 1981 on the development of a gasdynamic heater, project Vulcan, is summarized. This heater is considered to be uniquely qualified to provide a quasi-steady flow of hot gas (4500 K discharge temperature and 2 atm discharge pressure) for broad metallurgical and physical chemistry applications. The work reported contains an examination of the diagnostic requirements for the heater, and recommendations for the deployment of these diagnostics. The instrumentation requirements for performance testing are discussed and certain types of instruments are recommended. DOE

N82-29573# Oak Ridge National Lab., Tenn. Energy Div.
STEADY-STATE COMPUTER DESIGN MODEL FOR AIR-TO-AIR HEAT PUMPS
S. K. Fischer and C. K. Rice Dec. 1981 198 p refs
(Contract W-7405-eng-26)
(DE82-007499; ORNL/CON-80) Avail: NTIS HC A09/MF A01

A FORTRAN-4 computer program to predict the steady-state performance of conventional, vapor compression, electrically-driven, air-to-air heat pumps in both heating and cooling modes is described. This model is intended to serve as an analytical design tool for use by heat pump manufacturers, consulting engineers, research institutions, and universities in studies directed toward the improvement of heat pump performance. The heat pump design model allows the user to specify: system operating conditions, compressor characteristics, refrigerant flow control devices, fin-and-tube heat exchanger parameters, fan and indoor duct characteristics, and any of ten refrigerants. The model will compute: system capacity and COP (or EER), compressor and fan motor power consumptions, coil outlet air dry- and wet-bulb temperatures, air- and refrigerant-side pressure drops, a summary of the refrigerant-side states throughout the cycle, and overall compressor efficiencies and heat exchanger effectiveness. Documentation of how to use and/or modify the model is provided. DOE

N82-29574# California Univ., Berkeley. Dept. of Mechanical Engineering.
INVESTIGATION OF FREE-FORCED CONVECTION FLOWS IN CAVITY-TYPE RECEIVERS Final Yearly Report, 1979 - 1980
J. A. C. Humphrey, Frederick S. Sherman, Patrick LeQuere, Kang-Shin Chen, Lori Miller, and Wai-Ming To Jan. 1982 98 p refs Prepared for Sandia Labs., Livermore, Calif.
(Contract DE-AC04-76DP-00789)
(DE82-010034; SAND-79-8196) Avail: NTIS HC A05/MF A01

Experimental and theoretical research on free-forced convection flows in cavity type solar receivers is summarized. Experimental and theoretical results are presented and discussed. The implication of these findings with respect to the future thrust of the research program is clarified. Following various related conclusions, a summary and tentative schedule of work projected for the next year of research are presented. DOE

N82-29575# United Technologies Research Center, East Hartford, Conn.
PARAMETRIC PERFORMANCE STUDIES ON FLUIDIZED-BED HEAT EXCHANGERS Quarterly Technical Progress Report, 1 Oct. - 31 Dec. 1981
R. C. Stoeffler Jan. 1982 14 p refs
(Contract DE-AC22-81-PC-04280)
(DE82-010054; DOE/PC-40280/T2; R82-915729-7) Avail: NTIS HC A02/MF A01

The performance of single and multistage shallow fluidized beds is investigated for possible application to the recovery of heat from sources such as waste heat, and coal combustion or coal gasification. Tests are conducted to (1) investigate the effects of fouling due to liquid condensate in the gas stream on fluidized bed heat exchanger performance, (2) investigate the performance of fluidized beds which are staged using baffle plates, and (3) investigate the effects of different heat exchanger surface geometries. Work is progressing in selecting the conditions for that portion of the program involving fouling by a liquid condensate, and in modifying the fluidized bed heat exchanger facility for the fouling experiments. Preliminary tests were conducted with water vapor injection. Water vapor and glycerol vapor were chosen as the condensates. The results are summarized as follows: (1) heat exchanger performance is seriously degraded by condensation when the dew point temperature exceeds the heat exchanger wall temperature; and (2) the performance decrease occurs as a result of particle adherence to the heat exchanger surface and not as a result of particle agglomeration. DOE

N82-29576# Lehigh Univ., Bethlehem, Pa. Inst. of Thermo-Fluid Engineering and Science.
USE OF A FLUIDIZED BED HEAT EXCHANGER TO IMPROVE THE PERFORMANCE OF A HEAT PUMP Final Report
R. G. Sarubbi and J. C. Chen Sep. 1981 112 p refs
(Contract DE-AS02-77ET-11297)
(DE82-007841; DOE/ET-11297/T1; COO-4490-10) Avail: NTIS HC A06/MF A01

The outdoor evaporator heat exchanger of a 60,000 Btu heat pump in the heating mode was replaced with a fluidized bed heat exchanger. Air temperature control was achieved by recirculating the conditioned air from both the evaporator and condenser heat exchangers through a chambered plenum. Candidate particles and distributor plates for the design of the bed were tested separately. A particle size of 245 microns (glass spheres) at a static bed depth of 1-1/2 in. and a fluidizing air flow of 2.3 fps gave a heat transfer coefficient of 550 W/sq m OC and the best heat transfer to pressure drop ratio. The overall design heat transfer coefficient was 43 Btu/h-sq ft OF, which is about 5 times that of the conventional heat pump heat transfer coefficient. The heat exchanger consisted of two 20 sq ft shallow beds with a static bed 1-1/2 in. high. Particles used were sand, predominantly 300 microns in dia. DOE

N82-30217 Software and Engineering Associates, Inc., Santa Ana Heights, Calif.
IMPROVED BOUNDARY LAYER MODULE (BLM) FOR THE SOLID PERFORMANCE PROGRAM (SPP)
Douglas E. Coats and Tuncer Cebeci (CBC Enterprises, Inc.) *In*

APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 13-20 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

N82-30219 KVB, Inc., Irvine, Calif.
OD3P REPORT Status Report
S. C. Hunter *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 51-68 ref (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

N82-30226 Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
INTERNAL FLOWFIELD INVESTIGATION: AN OVERVIEW
R. L. Acree *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 159-167 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

N82-30228 Thiokol Corp., Brigham City, Utah.
USE OF SOLA TO PREDICT UNSTEADY INCOMPRESSIBLE VISCOUS FLOW IN BURNING GRAIN SLOTS
Mark Salita *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 205-229 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

N82-30236 Thiokol Corp., Brigham City, Utah.
USER EXPERIENCE WITH INTERIM VERSION SPP
Ralph Abel *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 315-327 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

N82-30262# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
MODEL BASED STUDY OF VARIOUS CONFIGURATIONS OF JET CROSSING A CAVITY. APPLICATION TO THE CEPRA 19 WIND TUNNEL OF PROPULSION TEST CENTER (CEPr)
P. Rebuffet and A. Guedel *In its* La Rech. Aerospatiale, Bi-monthly Bull. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 11-22 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A02/MF A01; original report in FRENCH available at ONERA, Paris FF 55

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N82-29577*# Systematics General Corp., McLean, Va.
HANDBOOK OF SENSOR TECHNICAL CHARACTERISTICS
Shelby Tanner Jul. 1982 333 p refs
(Contract NASw-3398)
(NASA-RP-1087; NAS 1.61:1087) Avail: NTIS HC A15/MF A01 CSCL 14B

Space and terrestrial applications remote sensor systems are described. Each sensor is presented separately. Information is included on its objectives, description, technical characteristics, data products obtained, data archives location, period of operation, and measurement and potential derived parameters. Each sensor is cross indexed. Author

N82-29578*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
COMPACT MAGNETOGRAPH Final Report
Alan M. Title, Bruce A. Gillespie, and James W. Mosher Feb. 1982 98 p refs
(Contract NASw-3457)
(NASA-CR-169193; NAS1.26:169193; LMSC/D834896) Avail: NTIS HC A05/MF A01 CSCL 14B

A compact magnetograph system based on solid Fabry-Perot interferometers as the spectral isolation elements was studied. The theory of operation of several Fabry-Perot systems, the suitability of various magnetic lines, signal levels expected for different modes of operation, and the optimal detector systems were investigated. The requirements that the lack of a polarization modulator placed upon the electronic signal chain was emphasized. The PLZT modulator was chosen as a satisfactory component with both high reliability and elatively low voltage requirements. Thermal control, line centering and velocity offset problems were solved by a Fabry-Perot configuration. S.L.

N82-29579*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MAGNETIC TAPE RECORDING FOR THE EIGHTIES
Ford Kalil, ed Apr. 1982 176 p refs
(NASA-RP-1075; NAS 1.61:1075) Avail: NTIS HC A09/MF A01 CSCL 14E

The practical and theoretical aspects of state-of-the-art magnetic tape recording technology are reviewed. Topics covered include the following: (1) analog and digital magnetic tape recording, (2) tape and head wear, (3) wear testing, (4) magnetic tape certification, (5) care, handling, and management of magnetic tape, (6) cleaning, packing, and winding of magnetic tape, (7) tape reels, bands, and packaging, (8) coding techniques for high-density digital recording, and (9) tradeoffs of coding techniques. Author

N82-29580*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
METHOD OF AN APPARATUS FOR MEASURING TEMPERATURE AND PRESSURE Patent Application
C. L. Korb and J. E. Kalshoven, Jr., inventors (to NASA) Filed 28 May 1982 29 p
(NASA-Case-GSC-12558-1; US-Patent-Appl-SN-383086) Avail: NTIS HC A03/MF A01 CSCL 14B

A method and apparatus for making remote temperature and pressure measurements of air are described. For temperature measurements, a main laser beam (probe) is transmitted at a wavelength at which the gas, which may be atmospheric, has a relatively high temperature sensitive resonant absorption characteristic and a relatively low pressure sensitive absorption characteristic. For pressure measurements, the probe laser beam is transmitted at a wavelength at which the gas has a relatively high pressure sensitive absorption characteristic and a relatively low temperature sensitive absorption characteristic. In either case, a reference beam at a wavelength having a relatively non-absorbing temperature or pressure characteristic is transmitted colinearly with the probe beam. The ratio of the two beams returned by a target, which may be particles in the gas, the gas molecules themselves or a solid or liquid reflecting surface, is obtained to cancel the common absorption and scattering effects. NASA

N82-29581*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PHASE LINEAR INTERFEROMETER EXPERIMENT MAINTENANCE AND CALIBRATION MANUAL
Steven J. Goodman Jun. 1982 14 p
(NASA-TM-82486; NAS 1.15:82486) Avail: NTIS HC A02/MF A01 CSCL 14B

This manual describes the necessary procedures for assuring continuous lightning sferics data collection at Marshall Space Flight Center. The phase linear interferometer experiment is under evaluation as a candidate RF sensor to support the space based optical lightning mapper system. A.R.H.

N82-29582# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
A SATELLITE-BORNE LIMB SCANNING ULTRAVIOLET SPECTROMETER FOR THERMOSPHERIC REMOTE TESTING
James B. Pranke, Andrew B. Christensen, F. A. Morse, David R. Hickman, and William T. Chater 30 Apr. 1982 49 p refs

(AD-A114603; TR-0082(2940-04)-2; SD-TR-82-30) Avail: NTIS HC A03/MF A01 CSCL 14/2

A concave grating Wadsworth spectrometer designed to scan the ultraviolet limb of the earth was flown on a DoD satellite to obtain measurements of atmospheric emiss. ns in the wavelength range of 85 nm to 395 nm as a function of height above the solid earth. The instrument field of view was 0.14 deg x 3.8 deg corresponding to 8 km in the vertical and 230 km in the horizontal at the limb. Scanning motion was controlled by a momentum-compensated DC-torque motor mechanism that panned the line of sight across the limb corresponding to tangent altitudes of 80 km to 480 km. A set of three photon counting detectors, each viewing a separate exit slit, provided simultaneous coverage of the wavelength bands 85-120 nm (EUV), 110-163 nm (FUV) and 290-395 nm (UV), respectively. A separate photometric channel isolated the atmospheric sodium doublet at 589.0-589.6 nm. The grating position and instrument view angle were controlled by digital circuitry operating on hardwired and uplinked command instructions. The operating modes included a variety of scanning and fixed wavelength and view angle operations. A description of the instrument and several examples of the data are presented. These include the dayglow emissions from thermospheric oxygen and nitrogen that form the basis of a thermospheric density determination; auroral enhancements observed in these emissions and in hydrogen Ly alpha; and night-time sodium emissions. GRA

N82-29583# Fermi National Accelerator Lab., Batavia, Ill.
ENERGY DOUBLER CRYOLOOP TEMPERATURE MONITOR SYSTEM
G. Pucci and D. Howard Oct. 1981 11 p
(Contract DE-AC02-76CH-03000)
(DE82-004409; DOE/CH-03000/T6) Avail: NTIS HC A02/MF A01

The cryoloop temperature monitor system is a fully electronic system designed to monitor temperature at key points in the energy doubler cryoloop system. It is used for cryoloop diagnostics, temperature studies, and cooldown valve control. DOE

N82-29584# Rockefeller Univ., New York.
DEVELOPMENT AND PERFORMANCE OF A HIGH PRESSURE HYDROGEN TIME PROJECTION CHAMBER
Thomas J. Chapin, Rodney L. Cool, Konstantin Goulianos, Jerome P. Silverman, Gregory R. Snow, Harry Sticker, Sebastian N. White, and Yue-Hus Chou (Academia Sinica, Beijing) Oct. 1981 5 p refs Presented at the IEEE Nucl. Sci. Symp., San Francisco, 21-23 Oct. 1981
(Contract DE-AC02-81ER-40033)
(DE82-005518; DOE/ER-40033/13; RU-81/A-12) Avail: NTIS HC A02/MF A01

A high pressure hydrogen gas time projection chamber (TPC) which is presently operating both as target and as recoil detector in an experiment investigating the diffraction dissociation of photons on hydrogen is described. The TPC, which consists of two cylindrical drift regions each 45 cm in diameter and 75 cm long, measures the polar angle and the energy loss dE/dx of the recoil protons. Typically, at 15 atm of H2 with 2 kV/cm drift field and 7 kV on the 35 sigma sense wires, the drift velocity is about 0.5 cm/sigma sec and the spatial resolution + or - 200 sigma. DOE

N82-29585# Creare Products, Inc., Lebanon, N.H. IRAD GAGE Div.
CALIBRATION CHARACTERISTICS OF IRAD GAGE VIBRATING WIRE STRESSMETER AT NORMAL AND HIGH TEMPERATURE, VOLUME 1
Piyush K. Dutta, Robert W. Hatfield, and Peter W. Runstadler, Jr. Oct. 1981 117 p Prepared for California Univ., Livermore, Lawrence Livermore Lab. 2 Vol.
(Contract W-7405-eng-48)
(DE82-005512; UCRL-15426-Vol-1; Rept-80-2) Avail: NTIS HC A06/MF A01

Calibration studies of the IRAD GAGE Vibrating Wire Stressmeter are described. The work was performed to understand and interpret the behavior and performance of the stressmeter in Climax granite. To help interpret the results obtained in Climax granite, the study also included calibration tests of the gage in other materials: Barre granite, aluminum, and Lucite. Stressmeter calibrations were carried out in thin rock slabs by determining the relation between the stressmeter readings and uniaxial plane stresses. Calibrations were also conducted under biaxial and triaxial stress fields. DOE

N82-29586# Creare Products, Inc., Lebanon, N.H. IRAD GAGE Div.
CALIBRATION CHARACTERISTICS OF IRAD GAGE VIBRATING WIRE STRESSMETER AT NORMAL AND HIGH TEMPERATURE, VOLUME 2
Piyush K. Dutta, Robert W. Hatfield, and Peter W. Runstadler, Jr. Oct. 1981 91 p Prepared for California Univ., Livermore, Lawrence Livermore Lab. 2 Vol.
(Contract W-7405-eng-48)
(DE82-006862; UCRL-15426-Vol-2; Rept-80-2) Avail: NTIS HC A05/MF A01

Raw data for the calibration study tests for the IRAD GAGE vibrating wire stressmeter are presented. DOE

N82-29587# Los Alamos Scientific Lab., N. Mex.
MIXING OF FINAL STATE SPIN COMPONENTS IN THE HIGH RESOLUTION SPECTROMETER
Wayne Cornelius Dec. 1981 20 p
(Contract W-7405-eng-36)
(DE82-010038; LA-9130-MS) Avail: NTIS HC A02/MF A01

The mixing of scattered proton spin components by precession in the high resolution spectrometer (HRS) dipole magnets is discussed in terms of focal plane polarimeter (FPP) experiments. Explicit expressions are derived for calculation of polarizaton transfer parameters from focal plane polarizations. Also discussed are the effects of out-of-plane scattering at small laboratory angles on FPP measurements as well as analyzing power measurements. DOE

N82-29588# Danish Academy of Technical Sciences, Lyngby. Illuminating Engineering Lab.
THE COLLIMATED LIGHT PHOTOMETER
Erik Frederiksen Dec. 1981 176 p refs Sponsored by Teknologiradet
(PB82-162108; Rept-28; ISBN-87-81550-19-9) Avail: NTIS HC A09/MF A01 CSCL 14B

The errors involved in photometric measurements with the collimated light photometer are analyzed with special regard to those types of errors which are unique for this type of photometer. The most commonly found designs of light distribution photometers are described, i.e., those using an abnormal orientation of the luminaires during measurement, those with the luminaires in normal working orientation and without mirrors, those with one or more mirrors and finally some examples of short distance photometry. GRA

N82-29647# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
NONLINEAR RADIOMETRIC CALIBRATION OF MULTISENSOR SCANNER DATA [NICHTLINEARER RADIOMETRISCHER ANGLEICH VON MULTI-SENSOR-ABTASTER-DATEN]
Bernd-Siegfried Schulz *In its* Repts. on Cartography and Geodesy, Ser. 1: Original Rept., No. 84 1981 43-52 refs In GERMAN; ENGLISH summary (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

N82-29648# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
ON THE ENHANCEMENT OF DIGITAL BLACK AND WHITE IMAGES BY PREDETERMINED PRINTING FUNCTIONS [ZUR ANPASSUNG DIGITALER HALBTONBILDER AN VORGEGEBENE DICHTEFUNKTIONEN]
Klaus-Juergen Seegel *In its* Repts. on Cartography and Geodesy, Ser. 1: Original Rept., No. 84 1981 p 53-60 refs In GERMAN; ENGLISH summary (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

N82-30154# Hamburger Sternwarte (West Germany).
ON THE IMPORTANCE OF THE HIPPARCOS STELLAR NET FOR PHOTOGRAPHIC CATALOG WORK

C. deVegt *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 49-52 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30190# Geneva Observatory (Switzerland).
THE NEW GROUND-BASED PHOTOMETRIC MEASUREMENTS
M. Grenon *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 211-215 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30280# Joint Publications Research Service, Arlington, Va.
KATE-140 AND MKF-6M SPACE CAMERAS
V. Kuchumov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 89-92 Transl. into ENGLISH from Aviats. Kosmonavt. (USSR), no. 1, Jan. 1982 p 40-41 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

36 LASERS AND MASERS

Includes parametric amplifiers.

N82-29589* National Aeronautics and Space Administration. Pasadena Office, Calif.
COHERENTLY PULSED LASER SOURCE Patent
Jack S. Margolis, inventor (to NASA) (JPL, Calif. Inst. of Tech., Pasadena) Issued 1 Jun. 1982 6 p Filed 15 May 1980 Supersedes N80-24602 (18-15, p 1983) Sponsored by NASA (NASA-Case-NPO-15111-1; US-Patent-4,332,441; US-Patent-Appl-SN-150040; US-Patent-Class-350-358) Avail: US Patent and Trademark Office CSCL 20E

An electronically controllable apparatus is described which modulates a continuous wave laser beam so as to produce an output beam consisting of coherent pulses that are electronically controllable as to both pulse repetition rate and pulse width. The apparatus includes two acoustic devices positioned so that the laser beam passes through them in sequence, and apparatus for passing sound waves through the devices to frequency shift the laser radiation as well as to diffract it. Each acoustic device generates sound waves containing a group of frequencies which result in spaced pulses. The first acoustic device is countered by the second acoustic device to produce a collimated, coherently pulsed, laser beam.
Official Gazette of the U.S. Patent and Trademark Office

N82-29590# Rochester Univ., N. Y. Lab. for Laser Energetics.
DEVELOPMENT OF X-RAY LASER MEDIA: MEASUREMENT OF GAIN AND DEVELOPMENT OF CAVITY RESONATORS FOR WAVELENGTHS NEAR 130 ANGSTROMS Annual Scientific Report, 1 Jan. - 31 Dec. 1981
James Forsyth Feb. 1982 32 p refs
(Grant AF-AFOSR-0059-81; AF Proj. 2301)
(AD-A114765; AFOSR-82-0390TR) Avail: NTIS HC A03/MF A01 CSCL 20/5

Experiments showing improved levels of population inversion of soft X-ray transitions in laser heated plasmas were performed with a frequency tripled ND+3: glass laser facility. Optics have been fabricated which will allow line focus experiments to be performed with this facility in 1982. Design studies on soft X-ray cavity reflectors have continued. Author (GRA)

N82-29591# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
MULTIMODE LOW PRESSURE CW CHEMICAL LASER PERFORMANCE SOURCE FLOW EFFECTS
Harold Mirels Los Angeles Air Force Station, Calif. Space Division 25 Mar. 1982 53 p refs
(Contract F04701-81-C-0082; DARPA Order 3646)
(AD-A114473; TR-0082(2764)-2; SD-TR-82-012) Avail: NTIS HC A04/MF A01 CSCL 20/5

The performance of low pressure (inhomogeneously broadened) multiple longitudinal mode CW chemical lasers is investigated in the limit delta nu sub c << delta nu sub h , delta nu sub h << delta nu sub d where delta nu sub c, delta nu sub h, and delta nu sub d represent longitudinal mode separation, homogeneous width, and toppler width, respectively. Effects of source flow (i.e., mean motion in optical path direction) are included. The present approach, in which power on spectral lineshape is assumed a priori, yields physically realistic, self consistent solutions for laser flow regimes of practical interest. Numerical results, as well as analytic limit solutions, are provided. The decrement in net laser output power, caused by lack of saturation and by source flow, is evaluated. It is concluded that the latter can be estimated from numerical codes in which a single longitudinal mode is assumed at line center for each lasing transition, provided zero power line center gain is corrected for the source flow effect. It is also concluded that a limit solution deduced herein provides relatively accurate simple-closed-form analytic expressions for laser performance in the regime of interest. Author (GRA)

N82-29592# Aerospace Corp., El Segundo, Calif. Lab Operations.
ABSOLUTE RATE COEFFICIENTS FOR F + H(2) AND F + D(2) AT T = 295 - 765 K
R. F. Heidner, III, J. F. Bott, C. E. Gardner, and J. E. Melzer 5 May 1982 37 p refs
(Contract F04701-81-C-0082)
(AD-A114982; TR-0082(2930-01)-1; SD-TR-82-21) Avail: NTIS HC A03/MF A01 CSCL 07/4

In a recent publication, the absolute rates of the reactions of F + H2 and F + D2 were studied at T = 295 K. The results for F + H2 were in very good agreement with earlier studies performed with a variety of experimental techniques. The lack of previous absolute rate data for F + D2 was noted; however, the ratio of the rates for H2 and D2 was in excellent agreement with earlier relative measurements. These earlier measurements have been extensively reviewed. GRA

N82-29593# University of Southern California, Los Angeles.
MAGNETO TRANSPORT AND MAGNETO OPTICAL CHARACTERISTICS OF INVERSION AND ACCUMULATION LAYERS Interim Report, 1 Feb. 1981 - 31 Jan. 1982
N. P. Ong and A. Madhukar Jan. 1982 6 p refs
(Grant AF-AFOSR-3530-78; AF Proj. 2306)
(AD-A114930; AFOSR-82-0394TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

Theoretical computations were completed and published on the following subjects: Shubnikov-de Haas effect with electron impurity, electron-phonon interactions; cyclotron resonance in A 2-D Wigner crystal; sub-band structure for InP accumulation layers. A for -infrared molecular laser was constructed and measurements made on cyclotron absorption in Si (100) inversion layers. D.C. Magneto-Transport properties of Si (100) MOSFET's were carried out. Author (GRA)

N82-29594# Bendix Corp., Kansas City, Mo.
LASER CUTTING SHAPES IN PLASTICS
R. A. VanCleave Dec. 1981 49 p refs
(Contract DE-AC04-76DP-00613)
(DE82-007647; BDX-613-2727) Avail: NTIS HC A03/MF A01

A 1000 W CO2 laser is a versatile, reliable machine tool for processing a wide range of materials. Over 60 production parts fabricated with laser processing operations are described. Materials processed included high strength, reinforced plastics, thermoplastics, rubber, ceramic, and reinforcing cloth. Other development activities include glass to glass sealing, photoresist removal, Kapton insulation removal, metal working, rubber cutting, and ceramic marking. Laser processing variables and tooling concepts are described. DOE

N82-29595# California Univ., Livermore. Lawrence Livermore Lab.
PHYSICS OF LASER FUSION. VOLUME 1: THEORY OF THE CORONAL PLASMA IN LASER-FUSION TARGETS
C. E. Max (Ecole Polytechnique, Palaiseau) Dec. 1981 86 p refs 2 Vol.
(Contract W-7405-eng-48)
(DE82-007914; UCRL-53107-Vol-1) Avail: NTIS

HC A05/MF A01

The physics of the coronal region in laser fusion targets are discussed. The corona consists of hot plasma which has been evaporated from the initially solid target during laser heating. The laser light is absorbed in the corona by the target, and the resulting thermal energy is conducted toward cold high density regions, where ablation occurs. The topics discussed are: theoretical mechanisms for laser light absorption and reflection, hot electron production, and the physics of heat conduction in laser produced plasmas. The facilities, diagnostics, and data from recent laser fusion experiments are also reviewed. DOE

N82-29596# Raytheon Co., Bedford, Mass. Missile Systems Div.

CHARGING-CIRCUIT STUDY FOR COPPER-VAPOR LASERS Final Report, 29 Jun. - 30 Nov. 1981

1 Dec. 1981 28 p Sponsored in part by Lawrence Livermore National Lab.

(DE82-011076; UCRL-15431; BR-13047) Avail: NTIS HC A03/MF A01

Methods of charging high PRF pulsed power subsystems required in a proposed laser isotope separation (LIS) plant were evaluated. Eight potential charging methods were reviewed. The deQing methods of regulating the charging voltage of a pulse power conditioning module with respect to limitations imposed by continuous operation and the efficiency of recovery of energy diverted by the deQing circuitry was evaluated. DOE

N82-29597# Sandia Labs., Albuquerque, N. Mex.

Q-SWITCH AND FREE-RUNNING STABLE-PULSE 1060-nm LASER

M. J. Landry and H. P. Davis 1981 10 p refs

(Contract DE-AC04-76DP-00789)

(DE82-007766; SAND-81-1317C; CONF-811229-4) Avail: NTIS HC A02/MF A01

The effects of laser cavity components on the stability of the energy and beam directivity of a Nd:glass laser oscillator are reported. The parameters included the water cooling glass tube surrounding the laser rod, the aperture and the end reflectors, i.e., two plane mirrors, a plane mirror and a porro prism, and two porro prisms. Both axes of the output coupler, the plane mirror, and only one axis of the porro prism required rigid constraints. In the two porro prism laser cavity, only one axis per prism required rigid constraints. The constraints of the other two orthogonal axes were satisfied by the right angle of the porro prism. The components of the stable laser cavity consisted of: two porro prisms end reflectors with their apexes at 900, a 50% reflectivity beamsplitter output coupler, a 0.96 cm diameter 17 cm long Nd(3) glass laser rod, a diffuse scattering glass tube surrounding the laser rod, a double elliptical pumping cavity, a 0.31 cm diameter aperture, a Pockels cell operating in its half wave voltage mode, and two polarizers. DOE

N82-29598# Science Research Council, Chilton (England).

SCIENCE AND ENGINEERING RESEARCH COUNCIL CENTRAL LASER FACILITY Annual Report

Mar. 1981 322 p refs

(DE81-700417; RL-81-040) Avail: NTIS (US Sales Only) HC A14/MF A01; DOE Depository Libraries

The major reconstruction and upgrade of the glass laser, which was undertaken to increase the versatility of the facility, is described. Work on: glass laser development, laser plasma interactions, transport and particle emission studies, ablative acceleration and compression studies, spectroscopy and XUV lasers, and theory and computation as described. Publications based on the work of the facility are listed. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N82-29599 British Library Lending Div., Boston Spa (England).

FIXED MOMENTUM WHEEL USING GREASED SPIRAL GROOVED BEARINGS

U. vanderWal 29 Jun. 1982 11 p refs Transl. into ENGLISH from Tijdschr. van het Ned. Elektron.-en Radiogenootschap (Netherlands), v. 41, no. 4, 1976 p 119-124

(BLL-Trans-WH-518-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

The application of a fixed momentum wheel with hydrodynamic spiral groove bearings and brushless commutation which is attractive for communication satellites with high reliability requirements is discussed. Characteristics and performance of such a wheel are presented. An angular momentum wheel provides an important subsystem in the attitude control of satellites. This type of angular momentum wheel is frequently kept at a fixed revolution speed for communications satellites. E.A.K.

N82-29600 British Library Lending Div., Boston Spa (England).

STUDY OF SPHERICAL HYDRODYNAMIC BEARINGS

O. B. Prikhodko and A. G. Kiselev 29 Jun. 1982 8 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii Mashinostr. (Moscow), v. 9, 1976 p 56-61

(BLL-Trans-WH-517-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

A method for calculating the dimensions of spherical bearings with hydrodynamic thrust pads in the form of spherical sectors was discussed. The bearing characteristics were determined on the assumption that only axial loads were acting on them. R.J.F.

N82-29601 British Library Lending Div., Boston Spa (England).

THEORETICAL PRINCIPLES FOR THE CALCULATION OF HYDRODYNAMIC SPHERICAL BEARINGS

A. G. Kiselev, A. M. Libin, O. B. Prikhodko, and V. Ya. Sashkov 29 Jun. 1982 7 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii Mashinostr. Moscow), v. 2, 1979 p 34-38

(BLL-Trans-WH-516-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

Algorithms were derived for the calculation of hydrodynamic, spherical, radial-thrust bearings, based on the solution of the Reynolds equation by the matrix run method. An assessment as made of the influence of the calculation grid dimensions on the accuracy of determination of the basic integral coefficients characteristic of bearing operation. The results of the calculation of the integral characteristics were given and analyzed and recommendations are made on the design of bearings with optimal parameters. R.J.F.

N82-29602 British Library Lending Div., Boston Spa (England).

TELEVISION SYSTEM OF AUTOMATIC GUIDANCE OF A WELDING HEAD FOR MILLS FOR WELDING LARGE-DIAMETER TUBES

E. M. Antoshchenko, Yu. A. Vorobev, V. A. Timchenko, and P. I. Kovalenko 5 Jul. 1982 9 p refs Transl. into ENGLISH from Stal (USSR), v. 4, 1981 p 68-69

(BLLD-M-26553-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

A system of automatic guidance of a welding head based on the scanning of the edges of a butt joint with a television camera is described. The circuits developed locate and identify the abutting edges and guide the welding heads by an automatic tracking system. The system has been operating successfully for about two years, with the incorporation of commercial television equipment. R.J.F.

N82-29603*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

MAGNETIC BEARING AND MOTOR Patent Application

Philip A. Studer, inventor (to NASA) Filed 31 Mar. 1982 19 p

(NASA-Case-GSC-12725-1; US-Patent-Appl-SN-364093) Avail: NTIS HC A02/MF A01 CSCL 13I

A magnetic bearing for passively suspending a rotatable element subjected to axial and radial thrust forces is disclosed. The magnetic bearing employs a taut wire stretched along the longitudinal axis of the bearing between opposed end pieces and an intermediate magnetic section. The intermediate section is segmented to provide oppositely directed magnetic flux paths between the end pieces and may include either an axially polarized magnets interposed between the segments. The end pieces, separated from the intermediate section by air gaps, control distribution of magnetic flux between the intermediate section

segments. Coaxial alignment of the end pieces with the intermediate section minimizes magnetic reluctance in the flux paths endowing the bearing with self-centering characteristics when subjected to radial loads. In an alternative embodiment, pairs of oppositely wound armature coils are concentrically interposed between segments of the intermediate section in concentric arcs adjacent to radially polarized magnets to equip a magnetic bearing as a torsion drive motor. the magnetic suspension bearing disclosed provides long term reliability without maintenance with application to long term space missions such as the VISSR/VAS scanning mirror instrument in the GOES program. J.M.S.

N82-29604*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

WORKPIECE POSITIONING VISE Patent Application

Frederick C. Hallberg and Clyde J. Morgan, inventors (to NASA) Filed 31 Mar. 1982 16 p

(NASA-Case-GSC-12762-1; US-Patent-Appl-SN-364094) Avail: NTIS HC A02/MF A01 CSCL 13I

A pair of jaw assemblies simultaneously driven in opposed reciprocation by a single shaft has oppositely threaded sections to automatically center delicate or brittle workpieces such as lithium fluoride crystal beneath the blade of a crystal cleaving machine. Both jaw assemblies are suspended above the vise bed by a pair of parallel guide shafts attached to the vise bed. Linear rolling bearings, fitted around the guide shafts and firmly held by opposite ends of the jaw assemblies, provide rolling friction between the guide shafts and the jaw assemblies. A belleville washer at one end of the drive shaft and thrust bearings at both drive shaft ends hold the shaft in compression between the vise bed, thereby preventing wobble of the jaw assemblies due to wear between the shaft and vise bed. NASA

N82-29605*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

DIRECTIONAL GEAR RATIO TRANSMISSION Patent Application

Alan E. LeFever, inventor (to NASA) (Rockwell International Corp., Downey, Calif.) Filed 11 Jun. 1982 15 p Sponsored by NASA

(NASA-Case-LAR-12644-1; US-Patent-Appl-SN-387728) Avail: NTIS HC A02/MF A01 CSCL 13I

Epicyclic gear transmissions which transmit output at a gear ratio dependent only upon the input's direction are considered. A transmission housing envelops two epicyclic gear assemblies, and has shafts extending from it. One shaft is attached to a sun gear within the first epicyclic gear assembly. Planet gears are held symmetrically about the sun gear by a planet gear carrier and are in mesh with both the sun gear and a ring gear. Two unidirectional clutches restrict rotation of the first planet gear carrier and ring gear to one direction. A connecting shaft drives a second sun gear at the same speed and direction as the first planet gear carrier while a connecting portion drives a second planet gear carrier at the same speed and direction as the first ring gear. The transmission's output is then transmitted by the second ring gear to the second shaft. Input is transmitted at a higher gear ratio and lower speed for all inputs in the first direction than in the opposite direction. NASA

N82-29606*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SELF-LOCKING MECHANICAL CENTER JOINT Patent Application

Harold G. Bush and Richard E. Wallsom, inventors (to NASA) (Kentron International, Inc., Hampton, Va.) Filed 11 Jun. 1982 16 p

(NASA-Case-LAR-12864-1; US-Patent-Appl-SN-387646) Avail: NTIS HC A02/MF A01 CSCL 13I

A device for connecting, rotating and locking together a pair of structural half-columns is described. The present embodiment comprises a pair of cylindrical hub assemblies connected at their inner faces by a spring loaded hinge; each hub assembly as a structural half column attached to its outer end. Each hub assembly includes a cylindrical hub and a locking ring moveably attached around the hub's hinged end. Each locking ring has a plurality of 'L' shaped teeth projecting outward perpendicularly from its circumference and is attached around the hub subject to the force of a spring connected to both the ring and hub. Each cylindrical hub has a latch mechanism for holding each locking ring in a rotated position against the force of the spring and a hammer mechanism for disenagaging the latch mechanism on the opposing hub when the hubs are rotated together. The structural half columns connected to the hinged pair of hub assemblies are stored so that the hub assemblies are rotated away from each other and are subject to the force of their spring loaded hinge. NASA

N82-29607*# Cincinnati Univ., Ohio. Dept. of Mechanical Engineering.

ON FINITE ELEMENT STRESS ANALYSIS OF SPUR GEARS

S. H. Chang and R. L. Huston Jul. 1982 53 p refs

(Grant NsG-3188)

(NASA-CR-167938; NAS 1.26:167938) Avail: NTIS HC A04/MF A01 CSCL 13I

Spur gear stress analysis results are presented for a variety of loading conditions, support conditions, root radii, and rime thicknesses. These results are obtained using the SAP-IV finite element code. The maximum stresses, occurring at the root surface, substantially increase with decreasing rim thickness for partially supported rims (that is, with loose fitting hubs). For fully supported rims (that is, with tight fitting hubs), the root surface stresses slightly decrease with decreasing rim thickness. The fillet radius has a significant effect upon the maximum stesses at the root surface. These stresses increase with decreasing fillet radius. Finally, the fillet radius has little effect upon the internal root section stresses. S.L.

N82-29608*# Battelle Columbus Labs., Ohio.

EVALUATION OF BEARING MOUNTING DESIGN AND EXCESSIVE WEAR PHENOMENA Final Report

J. W. Kannel 21 Jun. 1982 22 p refs

(Contract NAS8-33576)

(NASA-CR-162053; NAS 1.26:162053) Avail: NTIS HC A02/MF A01 CSCL 13I

The effect of bearing thermal growth on the effectiveness of the bearing preload springs on the space shuttle main engine high pressure oxygen turbopump (SSME HPTOP) were examined. The SSME HPTOP turbine end bearings, preload spring, and bearing mounting design were evaluated relative to spalling, excessive ball wear, possible thermal problems, and cage delamination. The magnitude of the thermal stresses required to cause high levels of ball wear were calculated. Plots of maximum sheer stress and maximum reversing shear versus the axial load for the 57 mm SSME HPTOP bearing were created. A plot of the bearing thermal growth versus preload spring deflection was generated. It was determined that metallic wear, rather than thermal growth, caused enlargement of the contact zone between ball and races, that high fatigue-inducing shear stresses are generated under increased loads, and that at temperatures between 100 and 150 deg C, the springs bottom out and very high loads are developed in the bearing. Allowance for adequate spring movement after assembly is recommended. J.D.

N82-29609# Dartmouth Coll., Hanover, N.H. School of Engineering.

FACTORS INFLUENCING THERMOMECHANICAL FAILURE OF FACE SEALS Interim Report, 1 Dec. 1980 - 30 Nov. 1981

Francis E. Kennedy, Jr., John N. Grim, and Roger P. Glovsky Jan. 1982 58 p refs

(Contract N00014-18-K-0090)

(AD-A110786) Avail: NTIS HC A04/MF A01 CSCL 20/11

A microscopic examination, an analytical study, and an experimental study were carried out to determine why and how thermocracking occurs in the mating ring of a mechanical face seal. Microscopic examination of the cobalt-based superalloy mating ring of a marine propeller shaft seal yielded a better understanding of the initiation and propagation of thermocracks in the seal ring and of the role played by second phase particles in thermocracking. An analysis of surface temperatures and stresses in the seal, using finite element techniques, showed that the dominant stresses in the seal components are thermal stresses. A thermocracking mechanism is proposed, based on the analytical study, which agrees well with all microscopic

features. The analytical model assumed that thermoelastic instabilities cause concentrated contact patches to form at the seal interface prior to the onset of thermocracking. The presence of these contact patches was confirmed by use of a novel contact probe in the experimental study. Suggestions are made of steps that could be taken to alleviate the thermocracking problem and guidance is offered for the choice of future seal materials. GRA

N82-29610# Bendix Corp., Englewood, Colo. Office of Energy, Environment, and Technology.
DEVELOPMENT OF A LOW COAL, AUTOMATED REMOTE CONTROLLED RESIN CARTRIDGE INSERTER, ROOF BOLT SPIN/THRUST/HOLD ASSEMBLY Final Technical Report
A. F. Ems Oct. 1981 180 p refs
(Contracts DE-AC22-76ET-13348; ET-76-C-01-8933; DI-BM-HO-262028)
(DE82-003733; DOE/ET-13348/T1) Avail: NTIS HC A09/MF A01

A bolter module that performs all functions required to install resin grouted roof bolts in low coal was developed and tested. Design concepts were established and the system effects of module installation on a variety of existing roof bolters, continuous miners, and emerging miner/bolters were studied. The design was accomplished. The fabrication, assembly, checkout, and initial laboratory test of the module was completed. Tests provided initial reliability data and improvement information. Extended testing was performed to provide reliability and maintenance performance data and information for further module improvements. Phase VI consisted of the organization and analyses of the test data was organized and analyzed. Operational and reliability improvements based upon the test data and the design work required for module mounting to the GFE multipurpose test chassis for underground test was implemented. DOE

N82-29611# California Univ., Livermore. Lawrence Livermore Lab. Nondestructive Evaluation Section.
NONDESTRUCTIVE EVALUATION OF ELECTRON-BEAM BRAZE JOINS
D. M. Boyd, J. F. Shackelford, B. W. Maxfield, and G. M. Taylor 18 Aug. 1981 16 p refs
(Contract W-7405-eng-48)
(DE82-005846; UCRL-53185) Avail: NTIS HC A02/MF A01

A nondestructive evaluation was carried out using holographic interferometry, microradiography, and eddy current testing for the inspection of electron beam braze joining of dissimilar metals. Stainless steel tubing was jointed to a gold-copper disk using a Cusil (copper/silver) brazing alloy. Holographic interferometry provided an indirect measure of strength by detecting the plastic deformation occurring as a result of applying a stress. Microradiography with the aid of computer graphics displays provided a means of measuring braze penetration into the stainless steel tube. Correlation of results with metallographic examination and microhardness measurements show that holography and microradiography each provide quantitative braze quality rankings. Each method correctly identified variations in braze quality independent of electron beam power (the only processing variable in sample fabrication). Eddy current results were consistent with the other NDE methods but appear to be based on variation in surface topography rather than electrical conductivity. DOE

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N82-29612 British Library Lending Div., Boston Spa (England).
ULTRASONIC WAVE FLAW TESTING OF WELDS OF VERY THICK STEEL PLATES BY THE MULTIPROBE TANDEM FLAW DETECTION METHOD
Onishi Tadaaki, Terada Yukihiro, Nakabayashi Masahiro, Tsujisaki Yoshio, and Yamada Taskashi 23 Jun. 1982 16 p refs Transl. into ENGLISH from Hitachi Zosen Giho (Japan), v. 36, no. 4, 1975 p 268-273
(BLL-RISLEY-TR-4148-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

The decrease in detectability of planar flaws in ultrasonic flaw detection testing and the effectiveness of the multiprobe tandem flaw detection method solve of problem were investigated. The flaw detection conditions were determined, and detection of natural flaws in a piece of practical welding work was carried out. It is found that the multiprobe tandem flaw detection method is better for detecting planar flaws extending in the direction of the plate thickness than the single probe flaw detection method and that this multiprobe method makes the flaw detection work considerably simpler than the two probe method which is the same flow detection method. It is shown that the multiprobe method is a useful flaw detection method. E.A.K.

N82-29613 British Library Lending Div., Boston Spa (England).
CURRENT STATE AND FUTURE DEVELOPMENT OF NON-DESTRUCTIVE TESTING OF METAL PRODUCT QUALITY IN THE IRON AND STEEL INDUSTRY
R. V. Lyambakh and A. V. Malinka 5 Jul. 1982 9 p refs Transl. into ENGLISH from Stal (USSR), v. 4, 1981 p 74-78 (BLLD-M-26554-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The state of the art of nondestructive testing in the USSR is reviewed. Special attention is given to quality in the iron and steel industry. L.F.M.

N82-29614# Vanzetti Systems, Inc., Stoughton, Mass.
INFRARED DETECTION OF FAULTY SOLDER JOINTS, PHASE 2.2.
Alan C. Traub 1 Mar. 1982 190 p
(Contract F04606-80-C-1338)
(AD-A112703) Avail: NTIS HC A09/MF A01 CSCL 14/5

An experimental model of a laser/thermal testing system for solder joints has been evaluated during tests on 1,074 joints. Certain types of defect in through-hole and lap joints are revealed by this method, which seeks out variations in surface quality and in thermal mass. The possibility of accidental laser-beam damage to substrates was also investigated. A means of reducing this possibility was conceived and implemented. The feasibility of testing solder joints covered by a conformal coating was confirmed. Several improvements in the system design concept were effected during the course of the work. Author (GRA)

N82-29615# Massachusetts Inst. of Tech., Cambridge. Center for Policy Alternatives.
LIFE FORECASTING AS A LOGISTICS TECHNIQUE Final Report, Jan. - Oct. 1981
Robert T. Lund, Floyd R. Tuler, and John R. Elliott Jan. 1982 62 p refs
(Contract DAAG46-80-C-0099)
(AD-A114630; AMMRC-TR-82-2) Avail: NTIS HC A04/MF A01 CSCL 15/5

This document reports on a preliminary investigation of the use of reliability, nondestructive inspection (NDI) and life forecasting concepts in Army maintenance practice. The report includes the following major topics: (1) and overview of the Army Reliability Centered Maintenance (RCM) program, (2) brief discussion of NDI methods, (3) summary of life forecasting techniques, (4) alternatives for expanding use of RCM by incorporating life forecasting methodologies, and (5) conclusions and recommendations. GRA

N82-29616# Dayton Univ., Ohio. Research Inst.
EVALUATION OF NDE RELIABILITY CHARACTERIZATION, VOLUME 1 Final Report, Jul. 1980 - Aug. 1981
Alan P. Berens and Peter W. Hovey Wright-Patterson AFB, Ohio AFWAL Dec. 1981 89 p refs
(Contract F33615-80-C-5140; AF Proj. 2418)
(AD-A114467; UDR-TR-81-113; AFWAL-TR-81-4160-VOL-1) Avail: NTIS HC A05/MF A01 CSCL 12/1

To characterize the uncertainty in non-destructive evaluation (NDE), a probability of crack detection (POD) as a function of crack length is postulated where POD is defined as the proportion of cracks of a given length that would be detected by the NDE technique when applied by inspectors to structural elements in a defined environment. This report; (1) presents a statistical framework for describing the uncertainty in the NDE determinations; and (2) evaluated various characterizations of NDE

reliability. The data from a recent Air Force study on NDE reliability estimate the parameters of the NDE model. For these representative capabilities NDE reliability experiments are simulated. Different NDE capability characterizations are computed for each simulated experiment and are statistically compared. Author (GRA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N82-29617 British Library Lending Div., Boston Spa (England).
TWO METHODS OF DETERMINING STRESSES IN THIN PLATES WITH VARIABLE PROPERTIES DURING ONE SIDED HEATING
I. P. Tsibin, A. E. Shaikina, E. P. Taigildina, V. V. Chuvatov, and A. S. Telegin 5 Jul. 1982 13 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Chernaya Met. (USSR), no. 4, 1981 p 121-127
(BLLD-M-26568-(5828.4F)) Avail: British Library Lending Div., Boston Spa, England

Two methods of calculating stresses in thin plates heated from one side are described. They differ from others in that the boundary conditions set are not the average for the whole cross section but on each surface and are determined by external heat exchange. Among their possible applications is the selection of the optimal heating regime of industrial-furnace linings. As an example the two methods are worked through for a silica-concrete plate 0.455 m thick. Author

N82-29618# Materials Research Labs., Melbourne (Australia).
A C-SHAPED FRACTURE TOUGHNESS SPECIMEN FROM THE WALL OF A 5 INCH/54, MK 64, NAVAL PROJECTILE
D. S. Saunders Oct. 1981 19 p refs
(MRL-R-831; AR-002-737) Avail: NTIS HC A02/MF A01

The suitability of a C-shaped specimen configuration for the measurement of the fracture toughness of an artillery projectile manufactured from a high fragmentation steel is examined. A conventional shell steel, taken from the Australian 5 inch/54 HE naval projectile, was heat treated to fracture toughness states approximately corresponding to those of the steels used in high fragmentation projectiles. The practical aspects of specimen preparation and testing are assessed in this work. Author

N82-29619*# Georgia Inst. of Tech., Atlanta. Center for the Advancement of Computational Mechanics.
CREEP CRACK-GROWTH: A NEW PATH-INDEPENDENT INTEGRAL (T SUB c), AND COMPUTATIONAL STUDIES Ph.D. Thesis Final Report
R. B. Stonesifer and S. N. Atluri Jul. 1982 112 p refs
(Grant NAG3-38)
(NASA-CR-167897; NAS 1.26:167897) Avail: NTIS HC A06/MF A01 CSCL 20K

The development of valid creep fracture criteria is considered. Two path-independent integral parameters which show some degree of promise are the C* and (Delta T)sub c integrals. The mathematical aspects of these parameters are reviewed by deriving generalized vector forms of the parameters using conservation laws which are valid for arbitrary, three dimensional, cracked bodies with crack surface tractions (or applied displacements), body forces, inertial effects, and large deformations. Two principal conclusions are that (Delta T)sub c has an energy rate interpretation whereas C* does not. The development and application of fracture criteria often involves the solution of boundary/initial value problems associated with deformation and stresses. The finite element method is used for this purpose. An efficient, small displacement, infinitesimal strain, displacement based finite element model is specialized to two dimensional plane stress and plane strain and to power law creep constitutive relations. A mesh shifting/remeshing procedure is used for simulating crack growth. The model is implemented with the quartz-point node technique and also with specially developed, conforming, crack-tip singularity elements which provide for the r to the [n-(1+n)] power strain singularity associated with the HRR crack-tip field. Comparisons are made with a variety of analytical solutions and alternate numerical solutions for a number of problems. J.D.

N82-29620# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STRESSES IN THIN CONICAL SHELLS DUE TO LINE LOADS
Santiago Alves Tavares and Wolf Altman Mar. 1981 24 p refs
(INPE-2355-PRE/093) Avail: NTIS HC A02/MF A01

The differential equation for a line load uniformly distributed along a parallel circle is stablished from the homogeneous differential equations governing the bending behavior of a conical shell, whose solution is known in a complex form. The solution by means of the Green function is analyzed, and the conditions to be satisfied and the form of the function for any support condition given. The complex Green function constants are calculated and the form modified for obtaining the real and complex parts of the function in adequate form and, following this, for developing the stress and strain expressions. A numerical example comparing the solution obtained with the membrane solution is presented. Author

N82-29621# East Anglia Univ., Norwich (England). School of Mathematics and Physics.
ICE MECHANICS. PART 1: VISCOELASTIC SOLID RELATIONS FOR THE DEFORMATION OF ICE. PART 2: SINGLE INTEGRAL REPRESENTATIONS FOR NON-LINEAR VISCOELASTIC SOLIDS
U. Spring and L. W. Morland Dec. 1981 78 p refs
(Contract DAJA37-79-C-0005; DA Proj. 1T1-61102-BH-57)
(AD-A113510; TR-2) Avail: NTIS HC A05/MF A01 CSCL 20/11

The finite linear viscoelastic solid and single integral representation with non-linear dependence on history are investigated in uni-axial stress. Both integral kernels in the stress formulation are determined by single-step constant strain tests, and both kernels in the strain formulation are determined by single-step constant stress tests. Single integral stress and strain formulations are not equivalent. The stress histories required to maintain constant strain-rate for both models are determined from the Volterra integral equations given by the strain formulations once their kernels are determined by constant stress tests. A frame indifferent differential operator law relating stress, stress-rate, strain, and strain-rate is constructed to describe the qualitative features of both constant load and constant displacement rate response in uni-axial stress experiments. No lower order differential relation can describe both responses, but the two responses are not sufficient to determine the response coefficients of the relation. The jump relation is determined for a stress discontinuity applied in a general configuration. A simple initially isotropic model is proposed to investigate the effects of loading history and the anisotropy induced in a configuration following a loading-unloading cycle. GRA

N82-29622# New Mexico Univ., Albuquerque. Engineering Research Inst.
REINFORCED CONCRETE BEAMS UNDER COMBINED AXIAL AND LATERAL LOADING Final Report
Golden E. Lane, Jr. Kirtland AFB, N. Mex. AFWL Jan. 1982 232 p refs
(Contract F29601-76-C-0015; AF Proj. 672A)
(AD-A114375; NMERI-SSR-71; AFWL-TR-81-99) Avail: NTIS HC A11/MF A01 CSCL 13/13

Nine hinge-supported reinforced concrete beams were tested under displacement control with a proportional axial and symmetrical two-point lateral loading system. The nine beams were divided into three test series of three beams each. The beams in Series 1 contained shear reinforcement and were loaded monotonically to failure. Those in Series 2 contained no shear reinforcement and were loaded similarly to the first series. The Series 3 beams were shear reinforced and were loaded to failure under cyclic loading. Each beam had a 3.82-m span, a 229- by 381-mm cross section, and an effective depth of 317 mm. Reinforcement consisted of three No. 6 bars in tension and two No. 2 bars in compression. Shear reinforcement consisted of

No. 2 stirrups at a spacing of 152 mm. Measurements consisted of steel and concrete strain, axial and lateral loads, pressure, displacement, and rotation. The Series 1 and 3 beams failed in flexural tension, and the Series 2 beams failed in shear compression. Also reported are the results of two companion plain concrete testing programs: (1) multiaxial testing of cubes, and (2) displacement-controlled cylinder tests. Author (GRA)

N82-29623# Washington Univ., Seattle. Dept. of Mechanical Engineering.

DYNAMIC CRACK BRANCHING: A PHOTOELASTIC EVALUTION

M. Ramulu, A. S. Kobayashi, and B. S.-J. Kang May 1982 34 p refs

(Contract N00014-76-C-0060; NR Proj. 064-478)

(AD-A114525; UWA/DME/TR-82/43) Avail: NTIS HC A03/MF A01 CSCL 20/11

A necessary and sufficient condition for crack branching based on a crack branching stress intensity factor, K sub Ib, accompanied by a minimum characteristic distance of r sub c is proposed. This crack branching criterion is evaluated by dynamic photoelastic experiments involving crack branching of six single-edged notch specimens and six wedge-loaded rectangular double cantilever beam specimens. Consistent crack branching at K sub Ib = 2.04 Mpa(sq. rt. m) and r sub c equal 1.3 mm verified this crack branching criterion. The crack branching angle predicted by this crack branching criterion agreed well with those measured in the crack branching experiments. Author (GRA)

N82-29624# California Univ., Berkeley.

A VISCOPLASTIC PLANE FRAME BEAM COLUMN ELEMENT FOR PROGRAM FEAP Final Report, Sep. - Dec. 1980

John H. Slater and Robert L. Taylor May 1982 25 p refs

(Contract N62583-81-M-R439; ZR00001180)

(AD-A114461; CEL-CR-82.020) Avail: NTIS HC A02/MF A01 CSCL 09/2

A two-dimensional viscoplastic beam element was developed for the computer program FEAP. The element is suitable for small displacements or moderate rotations with negligible shear. The element is formulated in moment thrust space which will improve modeling of concrete beams. The viscoplastic formulation provides time dependent effects such as the influence of the strain rate upon the yield strength. GRA

N82-29625# Lehigh Univ., Bethlehem, Pa. Center for the Application of Mathematics.

BIFURCATION IN A ELASTIC PLATE ON A RIGID SUBSTRATE

R. S. Rivlin Jan. 1982 21 p refs

(Contract N00014-76-C-0235)

(AD-A114720; CAM-100-37) Avail: NTIS HC A02/MF A01 CSCL 20/11

An infinite plate of neo-Hookean elastic materials is bonded on one face to a rigid substrate. It is subjected to a uniform shear and dead-loaded with a uniform thrust. A periodic bifurcation solution is obtained when the thrust per unit area exceeds a critical value. The relation between the wave-length, thrust, amount of shear and plate thickness is obtained. Author (GRA)

N82-29626# Lehigh Univ., Bethlehem, Pa. Center for the Application of Mathematics.

FURTHER RESULTS ON THE STABILITY OF A THICK ELASTIC PLATE UNDER THRUST

K. N. Sawyers and R. S. Rivlin Apr. 1982 59 p refs

(Contract N00014-76-C-0235)

(AD-A114721; CAM-100-38) Avail: NTIS HC A04/MF A01 CSCL 20/11

The stability of the critical state for flexural buckling of a plate of incompressible isotropic elastic material with arbitrary strain-energy function is studied. Most of the analysis is carried out without restriction on the magnitude of the aspect ratio of the plate. However, the final result is limited to the case when the aspect ratio is such that terms of fourth degree in it may be neglected in comparison with terms of zero degree.

Author (GRA)

N82-29627# California Univ., Livermore. Lawrence Livermore Lab.

CORRELATION OF ACOUSTIC EMISSION GENERATED DURING UNIFORM BIAXIAL LOADING TO MICROSTRUCTURAL SOURCES IN 7075-T651 ALUMINUM AND 21Cr-6Ni-9Mn STAINLESS STEEL Final Report

E. Leon and A. K. Mukherjee Dec. 1981 70 p refs

(Contract W-7405-eng-48)

(DE82-006783; UCRL-15421) Avail: NTIS HC A04/MF A01

The effect on acoustic emission (AE) of uniform biaxial loading of a thin-walled tube designed by Hamstad, Patterson and Mukherjee is described. The AE generated during biaxial loading of 7075-T651 aluminum and 21Cr-6Ni-9Mn stainless steel had several anomalous features relative to tensile generated AE. The biaxial AE data was of a much higher level and peaked at a lower strain than the uniaxial AE response. A particle cracking model was proposed in which inclusions with the largest projected surface area perpendicular to the principal axis of applied loading will crack before smaller inclusions, and the resulting energy released per AE will be proportional to the crack surface area. The inclusion contents were studied with respect to size, shape, density, hardness, and fracture/decohesion behavior. The inclusions in both 7075-Y651 and 21-6-9 display the preferred cracking orientation predicted in the Hamstad, et al. model and are shown to be associated with the generated AE. However, other factors appear to contribute to the total AE responses.

DOE

N82-29628# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.

MICROFRACTURE IN BRITTLE SOLIDS M.S. Thesis

Jun Fu Oct. 1981 70 p refs

(Contract W-7405-eng-48)

(DE82-010167; LBL-13423) Avail: NTIS HC A04/MF A01

Microcracks can occur in ceramics subject to large localized residual stress, associated with a phase transformation or thermal contraction mismatch. The residual stress field in the absence of cracks can be calculated by using the three-step procedure given by Eshelby. The stress intensity factors for an evolving crack in the stress field can then be calculated by the superposition method. The microcracking process can be evaluated by comparing the stress intensity factors with the local fracture toughness of the material. Two microcracking cases have been studied by this method. Microcracking associated with the martensitic transformation of ZrO2 was analyzed. DOE

N82-29629# Atomic Energy Establishment, Winfrith (England). Technical Assessments and Safety Div.

DYNAMIC CRUSHING LOADS OF THIN-WALLED STEEL TUBES

A. J. Neilson Jan. 1981 96 p refs

(DE81-700999; AEEW-M-1830) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

Analysis of the extreme load behavior of structures experiencing missile impact requires estimates of impact loads to be made. A simple model for calculating the dynamic reaction load for a soft (crushable) missile is discussed and the results compared with measurements of impact loading and tube collapse for the axial impact of steel tubes on a load cell assembly. The ratios of wall thickness to tube diameter for the steel tubes ranged from 0.0047 to 0.025 and impact velocities from 113 to 315 m/s. It is shown that a simple calculation model based on the momentum balance provides satisfactory agreement with experimental results provided appropriate attention is paid to dynamic effects on material properties. DOE

N82-29630# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.

WIND LOADS ON SOLAR COLLECTOR STRUCTURE

R. A. Wilke and H. L. Chevalier Sep. 1981 42 p refs

(Contract DE-AC04-79AL-11774)

(DE82-010970; DOE/AL-11774/T1) Avail: NTIS HC A03/MF A01

Unsteady wind loads upon a full scale collector in a natural environment and turbulent flow loads upon a model of a collector array are examined. A description of the collector structure is described, the data acquisition system is outlined, and the results obtained are given. The interaction between the wind strength

and dynamic nature, and the structure itself were not determined either from the full scale data or the model test data from the wind tunnel. DOE

N82-29631# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
MECHANISTIC DISSIMILARITIES BETWEEN ENVIRONMENTALLY-INFLUENCED FATIGUE-CRACK PROPAGATION AT NEAR-THRESHOLD AND HIGHER GROWTH RATES IN LOWER-STRENGTH STEELS
S. Suresh and R. O. Ritchie Nov. 1981 34 p refs
(Contracts W-7405-eng-48; DE-AC02-79ER-10389)
(DE82-011105; LBL-13585) Avail: NTIS HC A03/MF A01

The role of hydrogen gas on fatigue crack propagation is examined for several classes of lower strength pressure vessel and piping steels. It was found that crack propagation rates are significantly higher in dehumidified gaseous hydrogen compared to moist air in two distinct regimes of crack growth. Both effects are seen at maximum stress intensities far below the sustained-load threshold stress intensity for hydrogen-assisted cracking. Characteristics of environmentally influenced fatigue crack growth in each regime are markedly different regarding fractography and the effect of variables as load ratio and frequency. It is concluded that the primary mechanisms responsible for the influence of the environment in each regime are distinctly different. Whereas corrosion fatigue behavior at intermediate growth rates can be attributed to hydrogen embrittlement processes, the primary role of moist environments at near threshold levels involves a contribution from enhanced crack closure due to the formation of crack surface corrosion deposits at low load ratios. DOE

N82-29632# Washington Univ., St. Louis, Mo. Dept. of Civil Engineering.
ANALYTICAL METHOD FOR DETERMINING SEISMIC RESPONSE OF COOLING TOWERS ON FOOTING FOUNDATIONS
Phillip L. Gould, Osama M. El-Shafee, and Bor-Jen Lee Oct. 1981 169 p refs
(Grant NSF PFR-79-00012)
(PB82-148008; NSF/CEE-81058; RR-60) Avail: NTIS HC A08/MF A01 CSCL 18I

A finite element model for the dynamic analysis of an axisymmetric thin rotational shell founded on a shallow ring footing is described. The model was developed using high precision rotational elements for the shell, isoparametric solid elements for the soil, and an energy transmitting boundary at the ring footing. In a sensitivity study of the equivalent boundary system to the driving frequency, the stiffness components were more sensitive than damping components and the rotational components were more sensitive than the translational components. GRA

N82-29633# Washington Univ., St. Louis, Mo. Dept. of Civil Engineering.
SHORE 4: FINITE ELEMENT PROGRAM FOR DYNAMIC AND STATIC ANALYSIS OF SHELLS OF REVOLUTION (THEORETICAL MANUAL) Final Report
O. M. El-Shafee, P. K. Basu, B. J. Lee, and P. L. Gould Oct. 1981 108 p refs 2 Vol.
(Grant NSF PRF-79-00012)
(PB82-147919; NSF/CEE-81057; RR-57) Avail: NTIS HC A06/MF A01 CSCL 13M

The theoretical background of the software (SHORE-4) for the static and dynamic analysis of axisymmetric shells and plates is provided. In the SHORE-4 program, the shell is discretized by high precision rotational shell finite elements of any quadratic shape. The thickness of the element may vary in the meridional direction. To consider the effect of regularly spaced members at the base or at some intermediate level of the shell, special open type elements are used. The shell may be orthotropic (single or multilayer), isotropic, or framed. The program can handle both axisymmetric and asymmetric external effects such as mechanical and thermal loads, horizontal and vertical base accelerations, and support settlements. The soil structure interaction can be included in the analysis for shells founded over shallow ring footing. The soil medium may be deep or shallow strata. The program can take care of layered soil material as well as half-space soil medium. GRA

N82-29634# Washington Univ., St. Louis, Mo. Dept. of Civil Engineering.
SHORE 4: FINITE ELEMENT PROGRAM FOR DYNAMIC AND STATIC ANALYSIS OF SHELLS OF REVOLUTION (USER'S MANUAL) Final Report
O. M. El-Shafee, P. K. Basu, B. J. Lee, and P. L. Gould Oct. 1981 124 p refs 2 Vol.
(Grant NSF PFR-79-00012)
(PB82-147927; NSF/CEE-81056; RR-56) Avail: NTIS HC A06/MF A01 CSCL 13M

The SHORE-4 computer program is designed for the linear static and dynamic analysis of arbitrarily loaded thin to moderately thick elastic shells of revolution. Axisymmetric shells founded on footing foundations may be analyzed dynamically including the soil structure interaction effect. This user manual describes the procedure to be followed in preparing the input data for this program. Cards for problem identification, problem control, element, nodal point, material information, displacement function, output requirement, control data, soil, and loading information are described. A number of sample inputs and outputs utilizing the various options of the program are included. The image of the system control cards used to run SHORE-4 is shown and the elements of the constitutive matrix for isotropic and single-year and multi-layer orthotropic shells are given. Intermediate printout options codes are provided. In addition, a program is provided for calculating Fourier coefficients. GRA

N82-30254*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LATERAL AND DRAG FORCES ON MISALIGNED CYLINDRICAL ROLLERS
H. McGinness *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 174-178 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 20K

N82-30263# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
NATURAL MODES OF AN IMMERSED STRUCTURE
J. Boujot and J. J. Angelini *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 23-29 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

42 GEOSCIENCES (GENERAL)

N82-29635# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPORTS ON CARTOGRAPHY AND GEODESY. SERIES 1: ORIGINAL REPORTS, NUMBER 83 [NACHRICHTEN AUS DEM KARTEN- UND VERMESSUNGSWESEN. REIHE 1: ORIGINALBEITRAEGE, HEFT NR. 83]
1981 80 p refs In GERMAN; ENGLISH summary
(ISSN-0469-4236) Avail: NTIS HC A05/MF A01

Work with regards to standardization of geographical names is reviewed for German-speaking countries. Tasks and objectives of the Permanent Committee on Geographical Names are presented. Technical terminology, uniformity in spelling, and phonetic transcription of foreign names are discussed. United Nations recommendations are mentioned. For individual titles, see N82-29636 through N82-29642.

N82-29636# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
HISTORY AND TASKS OF THE PERMANENT COMMITTEE ON GEOGRAPHICAL NAMES (PCGN) [GESCHICHTE UND AUFGABEN DES STAENDIGEN AUSSCHUSSES FUER GEOGRAPHISCHE NAMEN (StAGN)] **c81**
Josef Breu *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 7-14 refs In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)

Avail: NTIS HC A05/MF A01

Standardization of spelling of geographical names for German-speaking countries is discussed. The work of PCGN, an official body that regards itself as a coordination center for all important institutions and authorities of the German-speaking area concerned with the spelling of geographical names, is presented. Its most important objectives are standardization of the official and private use of the geographical names of the world for the German-speaking area and realization of the recommendations of the United Nations made on the national and international standardization of names in German-speaking countries. Two PCGN publications are a world gazetteer and a names list of the countries of the world and their capitals.

Author (ESA)

N82-29637# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

CONSIDERATIONS ON PHONETIC TRANSCRIPTION IN A GEOGRAPHIC GAZETTEER OF THE WORLD [UEBERLEGUNGEN ZUR AUSSPRACHE-NOTIERUNG IN EINEM GEOGRAPHISCHEN NAMENBUCH DER ERDE] **c82**

Otto Back *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 15-20 refs In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)

Avail: NTIS HC A05/MF A01

Problems faced by the Permanent Committee on Geographical Names in preparing a geographic gazetteer which covers non-European continents are addressed. Various issues of phonetic transcription are discussed. They include (1) decision on how a given geographic name is pronounced, or which pronunciation should be recorded; (2) problems related with the application of a phonetic transcription system; and (3) questions concerning the economy of phonetic transcription as seen in relation to its prospective users. The transcription should convey no more than the amount of information needed for achieving a pronunciation which is to be identifiable, socially acceptable, and in keeping with a German-speaking user's own pronouncing habits. As far as possible, the letter to sound relationships of Standard German are to be built into the system of phonetic transcription.

Author (ESA)

N82-29638# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

REPORT ON THE STANDARDIZATION OF GEOGRAPHICAL NAMES IN THE FEDERAL REPUBLIC OF GERMANY [BERICHT UEBER DIE STANDARDISIERUNG GEOGRAPHISCHER NAMEN IN DER BUNDESREPUBLIK DEUTSCHLAND] **c43**

In its Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 21-26 In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)

Avail: NTIS HC A05/MF A01

In connection with United Nations recommendations regarding the standardization of geographical names, West German practices of name acquisition for topographic maps are presented. Regulations and procedures that govern the acquisition and examination of geographical names at individual administrations before they are forwarded to the Permanent Committee on Geographical Names are discussed.

Author (ESA)

N82-29639# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

THE SITUATION WITH REGARDS TO STANDARDIZATION OF GEOGRAPHICAL NAMES IN AUSTRIA [DER STANDER STANDARDISIERUNG DER GEOGRAPHISCHEN NAMEN OESTERREICHS] **c43**

Josef Breu *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 27-38 refs In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)

Avail: NTIS HC A05/MF A01

The task of the standardization of Austrian geographical names is reviewed. This consists in ascertaining these names according to firm guidelines and in committing them to paper. Every ten years, a list of place names, containing the communes, inhabited places, and parts of inhabited places, is published by the Austrian Central Statistical Office. Standardization is achieved by providing the communes with precise toponymic instructions. All other geographical names of cartographic importance are within the competence of the Office of Gaging and Surveying. Progress in standardization of names on a map series is reported. Work with reference to United Nations recommendations is mentioned.

Author (ESA)

N82-29640# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

THE UNITED NATIONS GROUP OF EXPERTS ON GEOGRAPHICAL NAMES (UNGEGN) [DIE SACHVERSTAENDIGENGRUPPE DER VEREINTEN NATIONEN FUER GEOGRAPHISCHE NAMEN (UNGEGN)] **c43**

Emil Meynen *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 39-57 refs In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)

Avail: NTIS HC A05/MF A01

The question of adopting a standard method of writing geographical names on maps of the United Nations, including a draft program for achieving international uniformity in the writing of geographical names, is reviewed. Compilation of lists of technical terms and of national authorities on geographical names is discussed with reference to world cartography. Recommendations of UNGEGN are reported. These include proposals on the transliteration and transcription of geographical names as well as on conversion of writing systems. Data processing experience in the preparation of gazetteers is mentioned.

Author (ESA)

N82-29641# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

RESOLUTIONS OF UNITED NATIONS CONFERENCES ON THE STANDARDIZATION OF GENEVA (1967), LONDON (1971), AND ATHENS (1977) [BESCHLUESSE DER KONFERENZEN DER VEREINTEN NATIONEN FUER DIE STANDARDISIERUNG GEOGRAPHISCHER NAMEN VON GENF (1967), LONDON (1971) UND ATHEN (1977)] **c43**

In its Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 59-68 In GERMAN (For primary document see N82-29635 20-42)

Avail: NTIS HC A05/MF A01

Conference resolutions which have been handed down as recommendations are reviewed. Only recommendations which refer to German-speaking countries, specifically as concerns the Permanent Committee on Geographical Names, are considered. Proposals concern automatic data processing, national authorities on geographic names, and compilation of names lists. A geographic gazetteer, technical terminology, and the objective of international standardization in geographical names are discussed. Questions of documentation, spelling, and transcription of foreign writing systems are addressed.

Author (ESA)

N82-29642# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

TECHNICAL PROPOSALS FOR THE SPELLING OF COUNTRY NAMES AND THEIR DERIVATIVES, INCLUDING NATIONAL CAPITALS [WISSENSCHAFTLICHE EMPFEHLUNG FUER DIE SCHREIBWEISE DER STAATENNAMEN UND IHRER ABLEITUNGEN EINSCHLIESSLICH DER HAUPTSTAEDTE] **c43**

In its Rept. on Cartography and Goedesy. Ser. 1: Original Rept., No. 83 1981 p 69-79 In GERMAN (For primary document see N82-29635 20-42)

Avail: NTIS HC A05/MF A01

In connection with the work of the Permanent Committee on Geographical Names for the German-speaking countries, a spelling gazetteer is presented. Standard forms in German of country common names as well as their official names are given. The adjectival forms of the country names are also shown along with the nominative form, describing citizens. A list of national capitals is included.

Author (ESA)

N82-29643# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

REPORTS ON CARTOGRAPHY AND GEODESY. SERIES 1: ORIGINAL REPORTS, NUMBER 84 [NACHRICHTEN AUS DEM KARTEN- UND VERMES-

SUNGSWESEN. REIHE 1: ORIGINALBEITRAEGE, HEFT NR. 84]
1981 63 p refs In GERMAN; ENGLISH summary Map supplement included Original contains color illustrations
(ISSN-0469-4236) Avail: NTIS HC A04/MF A01

Applications of digital image processing in photogrammetry and cartography are presented. The formating of rectified LANDSAT data for the topographic aerial mapping project, TUEK 200, is covered. Nonlinear radiometric calibration of multisensor scanner data is also discussed as is image enhancement during digital to analog conversion. For individual titles, see N82-29644 through N82-29648.

N82-29644# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
APPLICATIONS OF DIGITAL GEOMETRICAL IMAGE PROCESSING IN PHOTOGRAMMETRY AND CARTOGRAPHY AS WELL AS FOR PLANNING [ANWENDUNGEN DER DIGITALEN GEOMETRISCHEN BILDVERARBEITUNG IN DER PHOTOGRAMMETRIE UND KARTOGRAPHIE SOWIE FUER PLANUNGEN] c43
Wolfgang Goepfert *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Rept., No. 84 1981 p 5-26 refs In GERMAN; ENGLISH summary (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

Digital geometric image processing as a cost effective solution to many problems encountered in photogrammetry, cartography, and in the use of planning and land information systems is surveyed. Basics of geometric image processing are presented, followed by practical aspects during implementation and programming stages. Examples, such as rectifications of scanner imagery, are shown and the establishment of thematic data bases from remotely sensed data as well as from digitized maps is explained. Author (ESA)

N82-29645# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
ON THE FORMATING OF RECTIFIED LANDSAT DATA IN MAP SECTIONS FOR TUEK 200 [UEBER DIE FORMATIERUNG ENTZERRTER LANDSAT-DATEN IM KARTENSCHNITT DER TUEK 200] c43
Kurt Klein *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Rept., No. 84 1981 p 27-31 In GERMAN; ENGLISH summary (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

The problem of image element boundary accuracy for a given data structure was studied. An editing routine was developed, programmed, and implemented on a digital image processing system. In order to display rectified LANDSAT data, according to the sheet lines of a topographic map, the sheet lines are generated as a raster data format. The functions of this program are described. Author (ESA)

N82-29646# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE TOPOGRAPHIC AERIAL 1:200,000 SCALE MAP OF THE FEDERAL REPUBLIC OF GERMANY (TUEK 200) IN ITS CONCEPTION [DIE TOPOGRAPHISCHE UEBERSICHTSKARTE 1:200,000 DER BUNDESREPUBLIK DEUTSCHLAND (TUEK 200) IN DER UMGESTALTUNG] c43
Peter J. Platt *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Rept., No. 84 1981 p 33-42 refs In GERMAN; ENGLISH summary Original contains color illustrations (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

Motivations, production, and revision of the map series, TUEK 200, are discussed. The map design is criticized. In particular, the representation of inhabited places is found lacking. An alternative style of depiction as well as different map symbols are suggested. Author (ESA)

N82-29647# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
NONLINEAR RADIOMETRIC CALIBRATION OF MULTISENSOR SCANNER DATA [NICHTLINEARER RADIOMETRISCHER ANGLEICH VON MULTI-SENSOR-ABTASTER-DATEN] c35
Bernd-Siegfried Schulz *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Rept., No. 84 1981 43-52 refs In GERMAN; ENGLISH summary (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

A calibration method is introduced that differs from those already existing by reason of a nonlinear model which enables a fit to any arbitrary number of discrete radiometric levels. The method was applied for the relative and absolute calibration of the six LANDSAT sensors in each spectral band. Diagrams and images demonstrate considerable improvement in the data.
Author (ESA)

N82-29648# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
ON THE ENHANCEMENT OF DIGITAL BLACK AND WHITE IMAGES BY PREDETERMINED PRINTING FUNCTIONS [ZUR ANPASSUNG DIGITALER HALBTONBILDER AN VORGEGEBENE DICHTEFUNKTIONEN] c35
Klaus-Juergen Seegel *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Rept., No. 84 1981 p 53-60 refs In GERMAN; ENGLISH summary (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

Fundamental radiometric problems, occurring during the digital to analog conversion process, are discussed. The optical reproducibility of digital image processing results on photographic film is considered. In terms of image quality and information content, enhancement of digital data can be defined by an image printing function, or transfer function. The correspondance between optical print and digital gray values is explained. Exact methods as well as simple, but effective techniques for the approximation of transfer functions are presented and illustrated by examples.
Author (ESA)

N82-29649# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPORTS ON CARTOGRAPHY AND GEODESY. SERIES 1: ORIGINAL REPORTS, NUMBER 85 [NACHRICHTEN AUS DEM KARTEN- UND VERMESSUNGSWESEN. REIHE 1: ORIGINALBEITRAEGE, NEFT NR. 85]
1981 175 p refs In GERMAN; ENGLISH summary Original contains color illustrations
(ISSN-0469-4236) Avail: NTIS HC A08/MF A01

Hardware and software for computer assisted cartography is presented. Interactive map preparation, data processing terminals, and quality of EDP cartographic products are discussed. Methodological problems with automatic digitization of maps and data storage techniques are covered. Computer systems programs are given and programming requirements are treated. Directions in modern computer design are also mentioned. For individual titles, see N82-29650 through N82-29663.

N82-29650# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
GEOMETRIC CONDITIONS WITH DIGITIZATION [GEOMETRISCHE BEDINGUNGEN BEI DER DIGITALISIERUNG] c64
Heinz Brueggemann *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 5-11 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

The recording accuracy of manual digitization procedures for data plotting is discussed with reference to cartography. Results show that the digitization error band is not sufficiently narrow to exclude visual discrimination between manual and automatically generated cartographic products. The problem is reduced to one of quality of geometric forms (right-angledness; true linearity; parallelism; adaptation of prescibed straightness). These criteria are defined as geometric conditions which can be recorded during digitization. By methods of adjustment, a more expressive and aesthetically more appealing cartographic representation is achieved. Author (ESA)

N82-29651# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

INTERACTIVE MAP PREPARATION UNDER COLOR MONITOR CONTROL WITH THE MDP SYSTEM [INTERAKTIVE KARTENBEARBEITUNG UNTER FARBMONITORKONTROLLE MIT DEM MDP-SYSTEM] **c43**

Armin Colditz *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 13-19 In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)

Avail: NTIS HC A08/MF A01

The image processing system, MDP, is described. The system, especially developed for the automation of cartographic work, comprises extensive scanning and recording units, a color monitor-image processing station, magnetic disk memory for map storage and an efficient central computer. Scanned and digitized color image data (scan data) can be subjected to interactive, optically controllable, and automatic modifications before the map result is recorded on film, separated according to colors.

Author (ESA)

N82-29652# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

METHODOLOGICAL PROBLEMS WITH THE AUTOMATIC DIGITIZATION OF GEOSCIENTIFIC MAPS [METHODISCHE PROBLEME BEIM AUTOMATISCHEN DIGITALISIEREN GEOWISSENSCHAFTLICHER KARTEN] **c43**

Matthias Dorn *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 21-29 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)

Avail: NTIS HC A08/MF A01

Automatic digitization of thematic maps, handling the geometric as well as substantial information, is surveyed. Scanner development, both hardware and software, is outlined. The economic necessity of scanner techniques for geoscientific map processing is stressed. The application of scanners initiates a working process the single steps of which are described. The time gained by rapid scanning must not be lost again through too much map editing and too many corrections. Only by satisfactory solution of the problem of pattern recognition for letters, numbers, symbols, and signatures, does scanning becomes methodical and economically rewarding.

Author (ESA)

N82-29653# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

PROGRAM DEVELOPMENT FOR THE INTERACTIVE VIDEO SYSTEM CD 400 AT THE BAVARIAN LAND SURVEY OFFICE [PROGRAMMENTWICKLUNG FUER DAS INTERAKTIVE BILDSCHIRMSYSTEM CD 400 AM BAYERISCHEN LANDESVERMESSUNGSAMT] **c61**

Bernhard Dresse *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 31-35 In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)

Avail: NTIS HC A08/MF A01

Computer system programs for the generation of cartographic products were improved, extending the capabilities of the Aristogrid CD 400 digitizer in processing cadastral maps. The interactive plotting program, TEILEN, is described along with the editing routine, LOESCH, for digitized maps. The program, TKRAND, which reduces the geometrical information in topographical maps and stores it in the CD 400 data bank is also presented. With these programs, higher system efficiency is achieved.

Author (ESA)

N82-29654# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

DATA MEMORY FOR RAPID ACCESS TO DATA ON SPACE-ADJACENT OBJECTS [DATENSPEICHERUNG FUER SCHNELLEN ZUGRIFF AUF DATEN RAEUMLICH BENACHBARTER OBJEKTE] **c82**

Andre Frank *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 37-47 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)

Avail: NTIS HC A08/MF A01

Problems of speedy access to stored data are addressed with reference to interactive data processing. A land information system able to handle a great number of data on space-defined, physically fixed objects (villages, streets, houses, trees, etc.) is considered as an example. In order to show the data graphically, in the form of a map on a CRT screen, data structures and retrieval algorithms are necessary which permit fast access to the data on adjoining objects in space. Such a method, relying on the control of placement of data on mass storage devices is presented. Retrieval time is almost independent of the number of data stored using this method and linear in the number of data retrieved. Tests based on a network data base management system show response time between 20 sec and 1 min, depending on the number of details required. This seems fast enough to permit interactive work.

Author (ESA)

N82-29655# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

THE AUTOMATIC DIGITIZATION SYSTEM FASTRAK [DAS AUTOMATISCHE DIGITALISIERUNGSSYSTEM FASTRAK] **c43**

R. I. Gallaway *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 49-52 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)

Avail: NTIS HC A08/MF A01

The FASTRAK operating principles and system functions are presented. The FASTRAK system combines three functions in one machine. It is an interactive automatic film scanner, a large screen storage display, and a precision microfilm recorder. The FASTRAK system philosophy is based on automating the tedious and error prone business of measurement, while retaining a human operator in the loop to control the sequence of data capture, to interpret and feature code data as it is captured, and to ensure the correctness of data capture. Vector structured data arises directly and built-in quality control ensures that corrective edit requirements are minimal (and often zero). Overall system throughput rates show a speed over manual data capture 10 to 15 times faster for contour data and 4 to 6 times faster for large scale plans and polygon data.

Author (ESA)

N82-29656# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

TOWARDS APPLICATION OF COMPUTER OUTPUT ON MICROFILM (COM) TECHNOLOGY IN COMPUTER ASSISTED MAP PRODUCTION [ZUR ANWENDUNG DER COM-TECHNIK BEI DER RECHNERGESTUETZTEN KARTENHERSTELLUNG] **c82**

Dietmar Gruenreich *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 53-66 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)

Avail: NTIS HC A08/MF A01

Cartographic applications of computer output microfilm (COM) technology are surveyed. A cathode ray microfilm plotter and a laser-scan microfilm plotter are described. These instruments for graphic data output allow a very rapid output of vector data. To what extent they can also meet all cartographic geometric and graphic quality requirements is still in question. The map making process with COM technology is examined. Future high resolution microfilm plotters are possible. At present, the advantages of this technology remain high speed data output and space economical data storage on microfilm.

Author (ESA)

N82-29657# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

A PROGRAM FOR THE AUTOMATIC PLOTTING OF ROAD NETWORKS [EIN PROGRAMM ZUR AUTOMATISCHEN ZEICHNUNG DES STRASSENNETZES] **c61**

Hartwig Junius *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 67-72 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)

Avail: NTIS HC A08/MF A01

Graphic representation of roadways (scale 1:5000) is discussed. Automatic plotting of road networks is not problematic when only road boundaries, parallel to retrieved digitized road axes, are desired. However, in the event of intersections and junctions, some editing (map retouching) is called for. In order to economize on processing time, a batch program is described which accomplishes this retouching simultaneously with road

boundary line computation. The program that generates intersection and junction area graphics is outlined. Author (ESA)

N82-29658# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
AUTOMATION IN PLANNING AND MASS MEDIA CARTOGRAPHY [AUTOMATION IN DER PLANNUNGS- UND PRESSEKARTOGRAPHIE] **c43**
Tomas Kaster *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 73-81 refs In GERMAN; ENGLISH and FRENCH summaries Original contains color illustrations (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

The map as an information and communication medium is considered through examples of EDP cartographic products. An increasing quantitative demand for graphics is noted. Steadily progressing technological development facilitates the transition from rather timid computer support in partial fields of cartography to integrated computer cartography without having to compromise quality. Raster techniques offer the cartographer a wide field of electronic image manipulation in input and output, raster techniques are also significant for their high processing speeds. Nevertheless, the vector technique still maintains its advantage of object-related storage. As for implementation of EDP, the qualification of persons entrusted with mapping tasks does not seem to keep pace with technical developments, be it because of lack of interest on the part of conventional cartographers, or because of an overestimation of the omnipotence of computer systems on the part of the user departments. Author (ESA)

N82-29659# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE GEOSCIENTIFIC DATA BANK SYSTEM, DASP [DAS GEOWISSENSCHAFTLICHE DATENBANKSYSTEM DASP] **c82**
Klaus Kuehne *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 83-98 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

The hardware and software of a user-friendly data base, DASP, is presented. The system was developed in order to replace the formerly used systems BGR/NLFB-DASCH and USGS-GRASP for most applications. Basic ideas of DASP, largely taken from DASCH and GRASP, are explained for the retrieval and synopsis of geological borehole data necessary for computer aided construction of Earth resources maps (Lower Saxony). The complete system program is described. Author (ESA)

N82-29660# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TECHNIQUES FOR CARTOGRAPHIC PRESENTATION OF ROAD NETWORKS [TECHNIKEN BEI DER KARTOGRAPHISCHEN DARSTELLUNG VON STRASSENNETZWERKEN] **c43**
Klaus Mueller *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 99-115 refs In GERMAN; ENGLISH and FRENCH summaries Original contains color illustrations (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

Three EDP techniques that are used for the mechanical production of thematic maps, based on digitally stored data, are presented. Problems addressed are: (1) detection of faulty coordinates by a numerical procedure; (2) integration of bridges in the course of lines, in the right sequence, used as auxiliary points for drawing route lineaments; and (3) inscription of the network without overlapping. Map examples are shown from a study of traffic capacity for the road network in the Federal Republic of Germany. Author (ESA)

N82-29661# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
DIGITAL IMAGE PROCESSING (DIP) AT THE INSTITUTE FOR PHOTOGRAMMETRY AND TOPOGRAPHY, KARLSRUHE UNIVERSITY: CARTOGRAPHIC APPLICATIONS [DIGITALE BILDVERARBEITUNG (DBV) AM INSTITUT FUER PHOTOGRAMMETRIE UND TOPOGRAPHIE (IPT) DER UNIVERSITAET KARLSRUHE - KARTOGRAPHISCHEANWENDUNGEN] **c61**
Gerhard Schweinfurth *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 117-135 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

Digital image processing (DIP) developments are reviewed and the configuration of a DIP system is described. It consists of a PRIME 500 minicomputer, a GRINNELL GMR-27 color display, and peripheral devices. The DIP methods which are implemented in the DIDAK digital data analysis system are applied to computer aided cartography. In this context, three routines are presented: (1) generalization of contour lines; (2) revision of maps using digital orthophotos; and (3) production of land use maps from LANDSAT data. Graphics produced with these routines are shown as examples. Author (ESA)

N82-29662# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPORT ON AN INDUSTRIAL VISIT TO OFFICES WITH COMPUTER-ASSISTED MAP PRODUCTION IN THE USA [BERICHT UEBER EINE INFORMATIONSREISE ZU DIENSTSTELLEN MIT AUTOMATIONSGESTUETZTER KARTENHERSTELLUNG IN DEN USA] **c61**
Wigand Weber *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 137-162 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

A visit to the U.S. Geological Survey Office, the Defense Mapping Agency, and the U.S. Army Engineers Topographic Laboratories is reported on. Information and exchange of ideas on recent developments in automated cartography were sought. Observations on cartographic digitization, data storage (geographic information systems), data manipulation, and graphic data output are presented. The variety of cartographic products possible and directions in modern computer design are also discussed.
Author (ESA)

N82-29663# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
PRINCIPLE AND METHOD OF AUTOMATIC GENERALIZATION OF CONTOURS [PRINZIP UND METHODE DER AUTOMATISCHEN GENERALISIERUNG DER RELIEFFORMEN] **c43**
He-Hai Wu *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 163-174 refs In GERMAN; ENGLISH; FRENCH and CHINESE summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

A method of automatic generalization of contours by groups, i.e. in consideration of the neighboring contours, is presented. The structure lines (primarily valley and ridge lines) are taken as natural connecting links between contour lines. The method is based on a data base interface. The problem consists in finding, in the quantity of the digitized contour line data, the structure points (valley points and ridge points) and in following the structure lines automatically. Subsequently, the structure line lengths can be computed as a quantitative basis for the generalization. Before automatic generalization is started, the original data must be compressed by eliminating all points other than structure points. In this procedure, most of the short valleys are represented by short, funnel-shaped curves with three control points. Automatic generalization now consists in finding all valley lines the lengths of which are smaller than a given threshold and in eliminating the contour line points contained in these lines. This way all short funnel shaped curves within the area of the eliminated short valleys are smoothed because their vertices, lying on the valley lines, are done away with.
Author (ESA)

N82-29664# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPORTS ON CARTOGRAPHY AND GEODESY, SERIES 1: ORIGINAL REPORTS, NUMBER 86 [NACHRICHTEN AUS DEM KARTEN- UND VERMESSUNGSWESEN, REIHE 1: ORIGINALBEITRAEGE, HEFT NR. 86]

1981 102 p refs In GERMAN; ENGLISH summary Original contains color illustrations
(ISSN-0469-4236) Avail: NTIS HC A06/MF A01

The facilities and activities of the Institute for Applied Geodesy, especially as concerns the Berlin branch office, are described. Compilation of maps, international cooperation in cartography, and publication of cartographic products and documents are discussed. Training of personnel as well as the equipment and systems used by the service are treated. For individual titles, see N82-29665 through N82-29672.

N82-29665# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TWENTY-FIVE YEARS AT THE BERLIN BRANCH OFFICE OF THE INSTITUTE FOR APPLIED GEODESY (1956 - 1981) [25 JAHRE AUSSENSTELLE BERLIN DES INSTITUTS FUER ANGEWANDTE GEODAESIE (1956-1981)]
Wolfgang Weber *In its* Rept. on Cartography and Geodesy, Ser. 1: Original Rept., No. 86 1981 p 9-24 refs In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

The history of the Berlin branch office, including tasks and objectives, is reviewed. The origins of the service are discussed. Facilities are described. Cartographic work, map reproduction, and printing services are outlined. Projects in progress are commented on. Author (ESA)

N82-29666# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
LOOKING AFTER THE OFFICIAL CARTOGRAPHIC WORK OF THE FORMER GERMAN REICH CONCERNING TERRITORY OUTSIDE THE FEDERAL REPUBLIC OF GERMANY [DIE BETREUUNG DER AMTLICHEN KARTENWERKE DES EHEMALIGEN DEUTSCHEN REICHES FUER DAS GEBEIT AUSERHALB DER BUNDESREPUBLIK DEUTSCHLAND] c43
Bernhard Lindholz *In its* Rept. on Cartography and Geodesy, Ser. 1: Original Rept., No. 86 1981 p 25-31 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

The development of land surveying as well as of production and updating of official maps are reviewed. Cartographic activities which were administered by the German Reich until 1945 are covered. A map of central Berlin, as it existed in 1939 and as it was in 1978, is commented on as an example. Author (ESA)

N82-29667# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
WORK AT THE BERLIN OFFICE ON THE 1 : 200,000 SCALE TOPOGRAPHICAL AERIAL MAP [DIE ARBEITEN DER AUSSENSTELLE BERLIN AN DER TOPOGRAPHISCHEN UEBERSICHTSKARTE 1 : 200,000] c43
Guenther Langkath and Gerhard Wittstock *In its* Rept. on Cartography and Geodesy, Ser. 1: Original Rept., No. 86 1981 p 33-45 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

Work on a 1:200,000 scale map of West Germany is commented on. The representation of topographical features is discussed. Editing problems which relate to the compilation of a thematic map series are reviewed. Symbols and depiction with reference to inhabited areas are treated. The updating of the map series is covered. Author (ESA)

N82-29668# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE TERRITORY OF THE FEDERAL REPUBLIC OF GERMANY AS PART OF THE 1 : 1,000,000 SCALE INTERNATIONAL WORLD MAP (IWM) [DIE INTERNATIONALE WELTKARTE (IWK) 1 : 1,000,000 FUER DAS GEBEIT DER BUNDESREPUBLIK DEUTSCHLAND] c43
Hans Eberhard Czeczor *In its* Rept. on Cartography and Geodesy, Ser. 1: Original Rept., No. 86 1981 p 47-53 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

The history of the compilation of the International World Map (IWM), especially as concerns cartographic activities within German territories, is reviewed. The first version of the IWM is discussed, including choice of projection. United Nations participation in the IWM project is covered. Author (ESA)

N82-29669# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TRAINING OF PERSONNEL SPECIALIZED IN CARTOGRAPHY [AUSBILDUNG VON KARTOGRAPHISCHEM FACHPERSONAL] c53
Gisela Beer *In its* Rept. on Cartography and Geodesy, Ser. 1: Original Rept., No. 86 1981 p 55-60 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

Training, since 1956, at the Berlin branch office of the Institute for Applied Geodesy is reviewed. The evolution of training requirements is discussed. Recruiting and hiring practices are summarized. Training at the university and professional levels is outlined. Author (ESA)

N82-29670# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPRODUCTION AND PRINTING AT THE BERLIN BRANCH OFFICE [REPRODUKTION AND DRUCK IN DER AUSSENSTELLE BERLIN] c82
Juergen Hoffmann *In its* Rept. on Cartography and Geodesy, Ser. 1: Original Rept., No. 86 1981 p 61-79 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

The equipment and technical capacities of the print shop are presented. Besides the traditional use of hand presses, the service utilizes offset printing, photolithography, and photographic reproduction techniques. The ability to handle large quantities of paper along with the availability of bookbinding facilities gives the print shop quasi-total autonomy in the publication of cartographic products. Author (ESA)

N82-29671# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
SALE OF MAPS AND PUBLICATIONS OF THE INSTITUTE FOR APPLIED GEODESY [VERTRIEB DER KARTEN UND VEROEFFENTLICHUNGEN DES INSTITUTS FUER ANGEWANDTE GEODAESIE] c82
Edelgard Feist *In its* Rept. on Cartography and Geodesy, Ser. 1: Original Rept., No. 86 1981 p 81-83 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

The distribution of cartographic products and cartography related publications to potential users is discussed. The organization of a marketing service is described. Cataloging of materials for easy access is treated. Storage and inventory control are mentioned. Author (ESA)

N82-29672# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
SCALE 1 : 1,000,000 DIGITAL CARTOGRAPHIC DATA BANK FOR THE FEDERAL REPUBLIC OF GERMANY [DIGITALE KARTOGRAPHISCHE DATENBANK 1 : 1,000,000 FUER DIE BUNDESREPUBLIK DEUTSCHLAND] c82
Ernst-Ulrich Fischer and Helmut Uhrig *In its* Rept. on Cartography and Geodesy, Ser. 1: Original Rept., No. 86 1981 p 85-100 refs In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

A generalized collection of digital topographical data is described. Data acquisition and storage is explained. The user oriented philosophy of the data bank is stressed as is the possibility of its integration into a wide variety of scientific, technical, or social information systems. Processing and output capabilities are outlined. Author (ESA)

N82-29673# California Univ., Berkeley. Lawrence Berkeley Lab. Earth Sciences Div.
EARTH SCIENCES DIVISION PROGRAMS Annual Report, 1980

Jul. 1981 262 p refs
(Contract W-7405-eng-48)
(DE82-000804; LBL-12100) Avail: NTIS HC A12/MF A01

The highlights of programs in Earth sciences are presented under four headings: geosciences, geothermal energy development, nuclear and marine sciences. Basic and applied research in a wide spectrum of topics are utilized. The programs provide results that will be of value in helping to secure the nation's energy future. Separate abstracts have been prepared for each project for inclusion in the Energy Data Base. DOE

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N82-29674*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SCIENCE REQUIREMENTS FOR FREE-FLYING IMAGING RADAR (FIREX) EXPERIMENT FOR SEA ICE, RENEWABLE RESOURCES, NONRENEWABLE RESOURCES AND OCEANOGRAPHY
Frank Carsey 1 Jun. 1982 54 p refs
(Contract NAS7-100)
(NASA-CR-169153; JPL-Publ-82-32; NAS 1.26:169153) Avail: NTIS HC A04/MF A01 CSCL 17I

A future bilateral SAR program was studied. The requirements supporting a SAR mission posed by science and operations in sea-ice-covered waters, oceanography, renewable resources, and nonrenewable resources are addressed. The instrument, mission, and program parameters were discussed. Research investigations supporting a SAR flight and the subsequent overall mission requirements and tradeoffs are summarized. Author

N82-29675*# Kent State Univ., Ohio. Dept. of Geology.
EVALUATION OF TERRAIN COMPLEXITY BY AUTOCORRELATION Final Report
Richard G. Craig [1982] 215 p refs
(Grant NAG5-165)
(NASA-CR-169140; NAS 1.26:169140) Avail: NTIS HC A10/MF A01 CSCL 08B

The topographic complexity of various sections of the Ozark, Appalachian, and Interior Low Plateaus, as well as of the New England, Piedmont, Blue Ridge, Ouachita, and Valley and Ridge Provinces of the Eastern United States were characterized. The variability of autocorrelation within a small area (7 1/2-ft quadrangle) to the variability at widely separated and diverse areas within the same physiographic region was compared to measure the degree of uniformity of the processes which can be expected to be encountered within a given physiographic province. The variability of autocorrelation across the eight geomorphic regions was compared and contrasted. The total study area was partitioned into subareas homogeneous in terrain complexity. The relation between the complexity measured, the geomorphic process mix implied, and the way in which geobotanical information is modified into a more or less recognizable entity is demonstrated. Sampling strategy is described. A.R.H

N82-29676*# California Univ., Santa Barbara. Dept. of Geography.
RELATION OF LAND USE/LAND COVER TO RESOURCE DEMANDS
Christopher Clayton Mar. 1981 52 p
(Grant NAG2-20)
(NASA-CR-166369) Avail: NTIS HC A04/MF A01 CSCL 08B

Predictive models for forecasting residential energy demand are investigated. The models are examined in the context of implementation through manipulation of geographic information systems containing land use/cover information. Remotely sensed data is examined as a possible component in this process. B.W.

N82-29677*# Washington Univ., St. Louis, Mo. Center for the Space Sciences.
PATTERN, AGE, AND ORIGIN OF STRUCTURAL FEATURES WITHIN THE OZARK PLATEAU AND THE RELATIONSHIP TO ORE DEPOSITS Final Report, 1 Jan. 1981 - 31 Dec. 1981
Raymond E. Arvidson 31 Dec. 1981 48 p refs Prepared for JPL
(Contracts NAS7-100; JPL-955959)
(NASA-CR-169202; JPL-9950-708; NAS 1.26:169202) Avail: NTIS HC A03/MF A01 CSCL 08B

Topography and gravity anomaly images for the continental United States were constructed. Evidence was found based on gravity, remote sensing data, the presence, trend, and character of fractures, and on rock type data, for a Precambrian rift through Missouri. The feature is probably the failed arm of a triple junction that existed prior to formation of the granite-rhyolite terrain of southern Missouri. B.W.

N82-29678*# Columbia Univ., New York. Lab. of Applied Geophysics.
INFRARED AIRBORNE SPECTRORADIOMETER SURVEY RESULTS IN THE WESTERN NEVADA AREA Final Report
William Collins, Sheng-Huei Chang, and John T. Kuo May 1982 64 p refs
(Contracts NAS7-100; JPL-955832)
(NASA-CR-169207; NAS 1.26:169207) Avail: NTIS HC A04/MF A01 CSCL 08B

The Mark II airborne spectroradiometer system was flown over several geologic test sites in western Nevada. The infrared mineral absorption bands were observed and recorded for the first time using an airborne system with high spectral resolution in the 2.0 to 2.5 micron region. The data show that the hydrothermal alteration zone minerals, carbonates, and other minerals are clearly visible in the airborne survey mode. The finer spectral features that distinguish the various minerals with infrared bands are also clearly visible in the airborne survey data. Using specialized computer pattern recognition methods, it is possible to identify mineralogy and map alteration zones and lithologies by airborne spectroradiometer survey techniques. Author

N82-29679# Bituminous Coal Research, Inc., Monroeville, Pa.
LONGWALL DATA BANK Semiannual Project Report, 28 May - 28 Nov. 1981
Dec. 1981 90 p
(Contract DE-AC01-81FE-00080)
(DE82-005090; DOE/FE-00080/2; BCR-L-1260) Avail: NTIS HC A05/MF A01

Progress is reported in compiling and transferring to the coal industry comprehensive longwall operational data representing 95% of the US longwall installations as well as presenting abstracts of domestic and foreign literature published since 1975 related to longwall production, productivity, and dust control. The literature search was completed, except for an ongoing review of weekly abstract publications. Working cards were completed for the comprehensive index file for all longwall publications of interest; and abstracts were prepared for selected longwall publications. Revised questionnaire forms, with information from the original questionnaires, were forwarded for updating to nearly all companies presently in the questionnaire file. Selected operational data were tabulated and compared. DOE

N82-29680# High Life Helicopters, Inc., Puyallup, Wash.
AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY, JORDAN QUADRANGLE, MONTANA Final Report
1981 154 p refs Prepared in cooperation with QEB, Inc., Lakewood, Colo. 2 Vol.
(Contract DE-AC13-76GJ-01664)
(DE81-025700; GJBX-180-81-Vol-2C) Avail: NTIS HC A08/MF A01

Thirty-one uranium anomalies meet the minimum statistical requirements as defined in Volume I. These anomalies are tabulated and are shown on the Uranium Anomaly Interpretation Map. Anomalies No. 1 to No. 3, and No. 10 to No. 12 are over areas underlain by the Tertiary Fort Union formation (Tftr, Tfu, Tft, Tfl). The lignites in this formation are commonly

uranium-bearing. Anomaly No. 4 is over an area underlain by late Cretaceous Bearpaw Shale (Kb) and Hell Creek formation (Khc). Anomalies No. 5 and No. 6 are over areas underlain by late Cretaceous Bearpaw Shale (Kb). Anomaly No. 7 is over an area underlain by late Cretaceous Bearpaw Shale (Kb) and Fox Hills Sandstone (Kfh). Anomalies No. 8, No. 14 to No. 16, and No. 23 to No. 30 are over areas underlain by late Cretaceous Bearpaw Shale (Kb). Anomaly No. 9 is over an area underlain by late Cretaceous Fox Hills Sandstone (Kfh). Anomalies No. 13 and No. 20 are over areas underlain by the late Cretaceous Hell Creek formation (Khc) and the Tertiary Fort union formation (Tfl). The lignite seams in both these formations are commonly uranium-bearing. Anomalies No. 17 to No. 18, and No. 21 are over areas underlain by the late Cretaceous Hell Creek formation (Khc). Lignite seams in this formation are commonly uranium-bearing. Anomaly No. 19 is over an area underlain by the Tertiary Fort Union formation (Tft). The lignite seams in this formation are commonly uranium-bearing. Anomaly No. 22 is over an area underlain by late Cretaceous Bearpaw Shale (Kb), Fox Hills Sandstone (Kfh), and the Hell Creek formation (Khc). Anomaly No. 31 is over an area underlain by Recent alluvium (Qal). DOE

N82-29681# Western Geophysical Co. of America, Houston, Tex. Aero Service Div.

AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY MEDFORD QUADRANGLE, OREGON Final Report

Apr. 1981 120 p refs 2 Vol.
(Contract DE-AC13-76GJ-01664)
(DE82-005545; GJBX-384-81-Vol-1) Avail: NTIS HC A06/MF A01

Traverse lines were flown in a east-west direction at a line spacing of three miles. Tie lines were flown north-south approximately twelve miles apart. A total of 16,880.5 line miles of geophysical data were acquired, compiled, and interpreted during the survey, of which 2925 line miles are in this quadrangle. These data were acquired to be compiled with and other information in order to assess the magnitude and distribution of uranium resources and to determine areas favorable for the occurrence of uranium in the United States. DOE

N82-29682# Carson Helicopters, Inc., Perkasie, Pa. Geoscience Div.

NURE AERIAL GAMMA-RAY AND MAGNETIC RECONNAISSANCE SURVEY OF PORTIONS OF NEW MEXICO, ARIZONA AND TEXAS. VOLUME 2: NEW MEXICO-ROSWELL NI 13-8 QUADRANGLE Final Report

Sep. 1981 129 p refs 2 Vol.
(Contract DE-AC13-76GJ-01664)
(DE82-006074; GJBX-412-81-Vol-2) Avail: NTIS HC A07/MF A01

The results of a high-sensitivity, aerial gamma-ray spectrometer and magnetometer survey of the Roswell two degree quadrangle, New Mexico are presented. Analysis of this radiometric data yielded 238 statistically significant eU anomalies. Of this number, seventy-four were considered to be of sufficient strength to warrant further investigation. DOE

N82-29683# National Coal Board, London (England). Mining Research and Development Establishment.

FIELD TRIALS WITH A ROADHEADER EQUIPPED WITH A 10,000 PSI WATER JET ASSIST SYSTEM

M. G. Tomlin Jul. 1981 40 p
(Contracts DE-AC01-78ET-13339; ET-78-C-01-3126)
(DE82-010837; DOE/ET-13339/1; TU(81)-10) Avail: NTIS HC A03/MF A01

Field trials at Middleton Mine with a Dosco Mk2A roadheader fitted with a prototype 10,000 psi water jet assist system are described, together with an appraisal of the performance of the equipment used. When cutting an artificially constructed Grindleford sandstone heading, no effect on specific energy rquirements or cutting rates were recorded when using jets. Benefits in the reduction, or elimination, of frictional sparking and dust make were, however, observed visually. More encouraging results were obtained when cutting Middleton limestone, especially the weather outer layer of exposed rock. Improved cutting rates were obtained with a high pressure water assistance, coupled with other benefits including increased pick life and reduced machine vibration. It is concluded that, while a 10,000 psi water jet assist system would not be wholly effective in a tough rock such as Middleton limestone, it could be used to good effect in the moderately hard stratas which a Dosco Mk2A cannot, at present, cut efficiently. It is further suggested that the application of jets at higher pressures could give even greater benefits. DOE

N82-29684# Council on Environmental Quality, Washington, D.C.

NATIONAL AGRICULTURAL LANDS STUDY Final Report

1981 110 p refs
(Contract DE-AI01-80EV-10395)
(DE82-005096; DOE/EV-10395/T1) Avail: NTIS HC A06/MF A01

NALS evaluated the nature, rate, extent and causes of the conversion of agricultural land to nonagricultural uses. The economic, environmental and social consequences of conversion are discussed. The various methods for retaining land for agriculture are evaluated. It recommends ways to reduce potential losses to the nation resulting from the continued conversion of agricultural lands. It is estimated that US farmers will need to plant between 84 and 143 million additional acres by the year 2000 to meet anticipated domestic and foreign demands for agricultural products. The result: most if not all the nation's good agricultural land is likely to be under cultivation by the century's end. DOE

N82-29685# Western Geophysical Co. of America, Houston, Tex. Aero Service Div.

AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: UKIAH QUADRANGLE, CALIFORNIA Final Report

Apr. 1981 144 p 2 Vol.
(Contract DE-AC13-76GJ-01664)
(DE82-005524; GJBX-390-81-Vol-2) Avail: NTIS HC A07/MF A01

The flight path, radiometric multi-parameter stacked profiles, magnetic and ancillary parameter stacked profiles, histograms, and anomaly maps for the Ukiah Quadrangle in California are presented. DOE

N82-29686# Western Geophysical Co. of America, Houston, Tex. Aero Service Div.

AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: WEED QUADRANGLE, CALIFORNIA Final Report

May 1981 188 p 2 Vol.
(Contract DE-AC13-76GJ-01664)
(DE82-005523; GJBX-391-81-Vol-2) Avail: NTIS HC A09/MF A01

The flight path, radiometric multi-parameter stacked profiles, magnetic and ancillary parameter stacked profiles, histograms, and anomaly maps for the Weed Quadrange in California are presented. DOE

N82-29687# Western Geophysical Co. of America, Houston, Tex. Aero Service Div.

AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: HURON QUADRANGLE, SOUTH DAKOTA Final Report

Apr. 1981 102 p 2 Vol.
(Contract DE-AC13-76GJ-01664)
(DE82-005562; GJBX-405-81-Vol-2) Avail: NTIS HC A06/MF A01

Aerial surveys were made in order to locate uranium deposits. The flight path, radiometric multiparameter stacked profiles, and magnetic and ancillary parameter stacked profiles are presented. Histograms, and anomaly maps for the Huron Quadrangle in South Dakota are also included. DOE

N82-29688# Western Geophysical Co. of America, Houston, Tex. Aero Service Div.

AIRBORN GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: ALTURAS QUADRANGLE, CALIFORNIA Final Report

Apr. 1981 161 p 2 Vol.
(Contract DE-AC13-76GJ-01664)

(DE82-005564; GJBX-406-81-Vol-2) Avail: NTIS HC A08/MF A01

The flight path, radiometric multi-parameter stacked profiles, magnetic and ancillary parameter stacked profiles, histograms, and anomaly maps for the Alturas Quadragle, California are presented. DOE

N82-29689# Western Geophysical Co. of America, Houston, Tex. Aero Service Div.

AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: CHICO QUADRANGLE, CALIFORNIA Final Report

Apr. 1981 241 p 2 Vol.

(Contract DE-AC13-76GJ-01664)

(DE82-005566; GJBX-407-81-Vol-2) Avail: NTIS HC A11/MF A01

The flight path, radiometric multi-parameter stacked profiles, magnetic and ancillary parameter stacked profiles, histograms, and anomaly maps for the Chico Quadrangle in California are presented. DOE

N82-29690# Western Geophysical Co. of America, Houston, Tex. Aero Service Div.

AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: SUSANVILLE QUADRANGLE, CALIFORNIA Final Report

Apr. 1981 188 p 2 Vol.

(Contract DE-AC13-76GJ-01664)

(DE82-005573; GJBX-410-81-Vol-2) Avail: NTIS HC A09/MF A01

The flight path, radiometric multi-parameter stacked profiles, magnetic and ancillary parameter stacked profiles, histograms, and anomaly maps for the Susanville Quadrangle in California are presented. DOE

N82-29691# Western Geophysical Co. of America, Houston, Tex. Aero Service Div.

AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: REDDING QUADRANGLE, CALIFORNIA Final Report

Apr. 1981 169 p 2 Vol.

(Contract DE-AC13-76GJ-01664)

(DE82-005563; GJBX-411-81-Vol-2) Avail: NTIS HC A08/MF A01

The flight path, radiometric multi-prameter stacked profiles, magnetic and ancillary parameter stacked profiles, histograms, and anomaly maps for the Redding quadrangle in California are presented. DOE

N82-29692# California Univ., Livermore. Lawrence Livermore Lab.

EFFECTS OF LONG TERM CO2 CONCENTRATION ON FIELD-GROWN CROPS AND TREES

G. E. Bingham, J. F. Thomas (North Carolina State Univ.), J. M. Smith (North Carolina State Univ.), D. W. Israel (Dept. of Agriculture), and H. H. Rogers (Dept. of Agriculture) 3 Nov. 1981 47 p refs

(Contract W-7405-eng-48)

(DE82-006776; UCID-19234) Avail: NTIS HC A03/MF A01

During the 1980 growing season four plant species, corn, soybean, loblolly pine, and sweetgum were exposed for 3 months to various CO2 levels. Exposure of plants growing in 18 1 pots took place in the field. Test atmospheres of CO2 at 340, 520, 718, and 910 ppM were generated in transparent open top cylinders ventilated about 1.06 m(3)/sec. Pure CO2 from a 14-ton liquid receiver was continuously injected into the ventilation air stream to generate the three elevated treatments. All treatments were replicated three times, and ambient treatments with and without chambers were established. Growth enhancement was observed in all four species. Decreased stomatal conductace with increasing CO2 concentration was documented in corn, soybean, and sweetgum (pine was not measured). Net CO2 uptake increased with increasing CO2 in soybean and sweetgum, but remained constant or slightly decrease in corn. Gross photosynthesis also increased in soybean, but remaned nearly constant or lightly increased in corn. Nitrogen fixation increased and accumulation of nitrogen was assessed. Changes in anatomy were observed. All data presented are for one late growing season in Raleigh, N.C. DOE

N82-29693# Oak Ridge National Lab., Tenn. Environmental Sciences Div.

EVALUATION OF REMOTE SENSING METHODS FOR STUDY OF VARIABLE HYDROLOGIC SOURCE AREAS

D. D. Huff, J. M. Kelley (Tennessee Valley Authority, Muscle Shoals, Ala.), and C. D. Sapp (Tennessee Valley Authority, Chattanooga) Jan. 1982 57 p refs

(Contract W-7405-eng-26; EPA-IAG-D6-0721)

(DE82-010328; ORNL-5800; ORNL-ESD-1794) Avail: NTIS HC A04/MF A01

The merit of using remote sensing techniques in conjunction with field studies of hydrologic transport was evaluated at three different sites that exhibit considerable contrast in terms of topography, geology, soils and vegetation. Color infrared photography and multispectral scanner data were collected, processed, manipulated, enhanced, and analyzed for the purpose of delineating variable hydrologic source areas. Analysis of the data showed that flying height, timing, terrain and vegetative cover were important considerations. Even though difficulties attributable to the previously mentioned factors were encountered, remote sensing techniques and products are definitely useful in hydrologic transport studies. DOE

N82-29694# Bendix Field Engineering Corp., Grand Junction, Colo.

URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE CHRISTIAN NTMS QUADRANGLE, ALASKA

D. L. Shettel, comp., S. L. Langfeldt, comp., C. A. Youngquist, comp., R. F. DAndrea, Jr., comp., and R. J. Zinkl, comp. Aug. 1981 95 p refs Prepared in cooperation with Los Alamos National Lab.

(Contract DE-AC13-76GJ-01664)

(DE82-010370; GJBX-205-81) Avail: NTIS HC A05/MF A01

A hyrogeochemical and stream sediment reconnaissance of the Christian NTMS Quadrangle, Alaska was reported. Location data, field analyses, and laboratory analyses of several different sample media are presented. The sample media are described and the analytical results for each medium are summarized. The data are subdivided into groups of stream sediment, lake sediment, stream water, lake water, and ground water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements are included. Also included are maps showing results of multivariate statistical analyses. DOE

N82-29695# Bendix Field Engineering Corp., Grand Junction, Colo.

URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE NAVRE NTMS QUADRANGLE, MONTANA

Oct. 1981 140 p refs

(Contract DE-AC13-76GJ-01664)

(DE82-010151; GJBX-184-81) Avail: NTIS HC A07/MF A01

Location data, field analyses, and laboratory analyses of several different sample media are presented. The information is divided into groups of stream-sediment, stream-water, and ground-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements are included. Maps showing results of multivariate statistical analyses are included. DOE

N82-29696# Bendix Field Engineering Corp., Grand Junction, Colo.

URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE TUCUMCARI NTMS QUADRANGLE, NEW MEXICO/TEXAS

Oct. 1981 82 p refs

(Contract DE-AC13-76GJ-01664)

(DE82-010152; GJBX-183-81) Avail: NTIS HC A05/MF A01

Results of a hydrogeochemical and stream sediment

reconnaissance (HSSR) of the Tucumcari NTMS quadrangle, New Mexico/Texas are presented. Location data, field analyses, and laboratory analyses of several different sample media are presented. The sample media are described and the analytical results for each medium are summarized. The data were subdivided by a sorting program into groups of stream-sediment and ground-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements are included. Maps showing results of multivariate statistical analyses are also included. DOE

N82-29697# Carson Helicopters, Inc., Perkasie, Pa. Geoscience Div.
NURE AERIAL GAMMA-RAY AND MAGNETIC DETAIL SURVEY. MIDNITE-SHERWOOD MINES, WASHINGTON AREA Final Report
Jun. 1981 1206 p
(Contract DE-AC13-76GJ-01664)
(DE82-010011; GJBX-182-Vol-2B-Midnite) Avail: NTIS HC A99/MF A01

Aerial reconnaissance flights were made in search of mineral deposits. Radiometric multiple parameter stacked profiles, magnetic and ancillary stacked profile data, multivariate histograms, and statistical summaries for uranium, thorium, potassium, uranium/potassium, uranium/thorium, and uranium/potassium are presented. DOE

N82-29698# Carson Helicopters, Inc., Perkasie, Pa.
NURE AERIAL GAMMA RAY AND MAGNETIC DETAIL SURVEY OF PORTIONS OF NORTHEAST WASHINGTON. VOLUME 1: DATA ACQUISITION, REDUCTION AND INTERPRETATION
Nov. 1981 296 p refs Prepared for Bendix Field Engineering Corp.
(Contract DE-AC13-76GJ-01664)
(DE82-010677; GJBX-1-82-Vol-1) Avail: NTIS HC A13/MF A01

A rotary wing detailed high sensitivity radiometric and magnetic survey was performed which encompassed 8 areas in the northeastern portion of Washington State. The total area surveyed consisted of approximately 9105 line miles. The radiometric data was corrected and normalized to 400 feet terrain clearance and identified as to rock type by correlating each sample with existing geologic map information. A multi-variate analysis was performed, which together with the radiometric and magnetic contour maps was utilized in the geochemical analysis of each area. The survey data is presented in the form of contour maps, stacked profiles, histograms and microfiche copies of the data listings. Author

N82-29699# Carson Helicopters, Inc., Perkasie, Pa. Geoscience Div.
NURE AERIAL GAMMA RAY AND MAGNETIC DETAIL SURVEY PORTIONS OF NORTHEAST WASHINGTON Final Report
Nov. 1981 299 p refs
(Contract DE-AC13-76GJ-01664)
(DE82-007141; GJBX-1-82) Avail: NTIS HC A13/MF A01

The Northeast area of Washington was surveyed. The program is designed to provide radioelement distribution information to assist in assessing the uraniferous material potential of the United States. The radiometric and ancilliary data were recorded and processed digitally. The results are presented in stacked profiles, contour maps, flight path maps, statistical tables and frequency distribution histograms. DOE

N82-29700# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE WHITE SULFUR SPRINGS NTMS QUADRANGLE, MONTANA
Nov. 1981 189 p refs
(Contract DE-AC13-76GJ-01664)
(DE82-005892; GJBX-266-81) Avail: NTIS HC A09/MF A01

A hydrogeochemical and stream sediment reconnaissance (HSSR) of the White Sulphur Springs NTMS quadrangle, Montana is presented. Location data, field analyses, and laboratory analyses of several different sample media are included. The sample media are described and the analytical results for each medium is summarized. The data were subdivided into groups of stream sediment, stream water, and ground water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements were included. Maps showing results of multivariate statistical analyses are also included. DOE

N82-29701# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE GRAND JUNCTION NTMS QUADRANGLE, COLORADO/UTAH
Nov. 1981 143 p
(Contract DE-AC13-76GJ-01664)
(DE82-000406; GJBX-264-81) Avail: NTIS HC A07/MF A01

Hydrogeochemical and Stream Sediment of the Kenai NTMS quadrangle, Colorado/Utah was studied. The data contain information on location, field analyses, and laboratory analyses of several different sample media. The sample media are described and the analytical results for each medium are summarized. The data are subdivided into groups of stream sediment, lake sediment, stream water, lake water, and ground water samples. For each group statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements are included. Maps showing results of multivariate statistical analyses are also included. DOE

N82-29702# Carson Helicopters, Inc., Perkasie, Pa. Geoscience Div.
NURE AERIAL GAMMA-RAY AND MAGNETIC DETAIL SURVEY. MT. LEONA-NANCY CREEK, WASHINGTON AREA Final Report
Jul. 1981 1178 p
(Contract DE-AC13-76GJ-01664)
(DE82-007143; GJBX-182-Vol-2B-Mt.Leona) Avail: NTIS HC A99/MF A01

The radiometric multiple parameter stacked profiles for the Mt. Leona-Nancy Creek, Washington area are examined. DOE

N82-29703# National Agricultural Lands Study, Washington, D.C.
NATIONAL AGRICULTURAL LANDS STUDY Final Report
1982 103 p
(Contract DE-AI01-80EV-10395)
(DE82-006230; DOE/EV-10395/T3) Avail: NTIS HC A06/MF A01

The availability of the nation's agricultural lands, the extent and causes of their conversion to other uses, and ways in which these lands might be retained for agricultural purposes was determined. The seven primary areas investigated are: agricultural lands in national and international perspective; America's agricultural land base; demands on agricultural land; allocation of agricultural land among competing demands; consequence of the infrastructure of US agriculture when agricultural lands are converted to non-agricultural uses; state and local actions affecting agricultural land availability for agricultural production; and influence of Federal programs on the availability of agricultural land. DOE

N82-29704# South Carolina Energy Research Inst., Columbia. Center for Organic Sediments Research.
PEAT RESOURCE ESTIMATION IN SOUTH CAROLINA Final Report, Year 2
M. Holmes, M. Andrejko, D. Corvinus, M. Tisdale, and T. J. Vigerstad Jan. 1982 101 p refs Prepared in cooperation with South Carolina Univ., Columbia
(Contract DE-FG01-79ET-14694)
(DE82-006852; DOE/ET-14694/T6) Avail: NTIS HC A06/MF A01

The results of the two years of a planned four-year study of the quantity and energy potential of pat in South Carolina is discussed. In this year's survey two activities were undertaken. The first was to visit highly probable peat deposits to confirm the presence of fuel-grade peat. The second was to survey and characterize in more detail the areas judged to be of highest

potential as major resources. The factors carrying the greatest weight in the determination of priority areas were: a description of peat deposits in the scientific literature or from discussions with state and federal soil scientists; mention of organic soils on soil maps or in the literature; and information from farmers and other local citizens. DOE

N82-29705# Montana Water Resources Research Center, Bozeman.
INVESTIGATIONS OF HIGH GROUNDWATER IN POLSON TERMINAL MORAINE Final Report
Gregory A. Kennett and Robert R. Curry Aug. 1981 64 p refs Prepared in cooperation with Montana Univ., Missoula
(Contract DI-14-34-0001-9028)
(PB82-157918; MWRRC-116; W82-02538; OWRT-A-119-MONT(1)) Avail: NTIS HC A04/MF A01 CSCL 08H

High groundwater areas in Polson, Montana, are located approximately 1 mile north of a terminal moraine and 3 miles north of a storge reservoir constructed in glacial outwash. The complexities of glacially deposited material and its associated permeabilities and porosities affect groundwater movement, shrinkwell of soils and soil drainage. The intensive development of regions south of Polson will need to address potential problems relating to high groundwater. GRA

N82-29706# National Weather Service, Garden City, N.Y. Eastern Region.
AN AFOS APPLICATIONS PROGRAM TO COMPUTE THREE HOURLY STREAM STAGES
Alan P. Blackburn Sep. 1981 29 p refs
(PB82-156886; NOAA-NWS-ERCP-2; NOAA-81103006) Avail: NTIS HC A03/MF A01 CSCL 08H

The computer program HYDRO, developed for forecasting stream flow is described. It computes 3 hour stages for selected stream gages in western New York State, but can be adapted to any location. HYDRO enables forecasters to easily compute stream stages if heavy precipitation occurs and a hydrologist is not available. This Basic program runs on the Eclipse S/230 minicomputer via the Data General Basic interpreter. T.M.

N82-29707# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Civil and Environmental Engineering.
A TWO-DIMENSIONAL COLLOCATION FINITE-ELEMENT MODEL FOR TRANSIENT MIXING IN NATURAL RIVERS
Yahia S. Halabi and Hung Tao Shen Aug. 1981 103 p refs Sponsored by NOAA
(PB82-163023; Rept-81-4; NOAA-81111203) Avail: NTIS HC A06/MF A01 CSCL 08H

Å numericalmodel for two dimensional, transient mixing for steady uniform flow in natural river channels was developed. Through the use of an orthogonal curvilinear coordinate system, the river channel is mapped into a rectangular strip by introducing the cumulative discharge as the new transverse coordinate. Concentration distribution in the channel is determined by a collocation finite element scheme. A computer program is developed and verified with analytical solutions and a steady state field measurement. GRA

N82-29638# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPORT ON THE STANDARDIZATION OF GEOGRAPHICAL NAMES IN THE FEDERAL REPUBLIC OF GERMANY [BERICHT UEBER DIE STANDARDISIERUNG GEOGRAPHISCHER NAMEN IN DER BUNDESREPUBLIK DEUTSCHLAND]
In its Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 21-26 In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)
Avail: NTIS HC A05/MF A01

N82-29639# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE SITUATION WITH REGARDS TO STANDARDIZATION OF GEOGRAPHICAL NAMES IN AUSTRIA [DER STANDER STANDARDISIERUNG DER GEOGRAPHISCHEN NAMEN OESTERREICHS]
Josef Breu *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 27-38 refs In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)
Avail: NTIS HC A05/MF A01

N82-29640# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE UNITED NATIONS GROUP OF EXPERTS ON GEOGRAPHICAL NAMES (UNGEGN) [DIE SACHVERSTAENDIGENGRUPPE DER VEREINTEN NATIONEN FUER GEOGRAPHISCHE NAMEN (UNGEGN)]
Emil Meynen *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 39-57 refs In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)
Avail: NTIS HC A05/MF A01

N82-29641# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
RESOLUTIONS OF UNITED NATIONS CONFERENCES ON THE STANDARDIZATION OF GENEVA (1967), LONDON (1971), AND ATHENS (1977) [BESCHLUESSE DER KONFERENZEN DER VEREINTEN NATIONEN FUER DIE STANDARDISIERUNG GEOGRAPHISCHER NAMEN VON GENF (1967), LONDON (1971) UND ATHEN (1977)]
In its Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 59-68 In GERMAN (For primary document see N82-29635 20-42)
Avail: NTIS HC A05/MF A01

N82-29642# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TECHNICAL PROPOSALS FOR THE SPELLING OF COUNTRY NAMES AND THEIR DERIVATIVES, INCLUDING NATIONAL CAPITALS [WISSENSCHAFTLICHE EMPFEHLUNG FUER DIE SCHREIBWEISE DER STAATENNAMEN UND IHRER ABLEITUNGEN EINSCHLIESSLICH DER HAUPTSTAEDTE]
In its Rept. on Cartography and Goedesy. Ser. 1: Original Rept., No. 83 1981 p 69-79 In GERMAN (For primary document see N82-29635 20-42)
Avail: NTIS HC A05/MF A01

N82-29644# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
APPLICATIONS OF DIGITAL GEOMETRICAL IMAGE PROCESSING IN PHOTOGRAMMETRY AND CARTOGRAPHY AS WELL AS FOR PLANNING [ANWENDUNGEN DER DIGITALEN GEOMETRISCHEN BILDVERARBEITUNG IN DER PHOTOGRAMMETRIE UND KARTOGRAPHIE SOWIE FUER PLANUNGEN]
Wolfgang Goepfert *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 84 1981 p 5-26 refs In GERMAN; ENGLISH summary (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

N82-29645# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
ON THE FORMATING OF RECTIFIED LANDSAT DATA IN MAP SECTIONS FOR TUEK 200 [UEBER DIE FORMATIERUNG ENTZERRTER LANDSAT-DATEN IM KARTENSCHNITT DER TUEK 200]
Kurt Klein *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 84 1981 p 27-31 In GERMAN; ENGLISH summary (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

N82-29646# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE TOPOGRAPHIC AERIAL 1:200,000 SCALE MAP OF THE FEDERAL REPUBLIC OF GERMANY (TUEK 200) IN ITS CONCEPTION [DIE TOPOGRAPHISCHE UEBERSICHTSKARTE 1:200,000 DER BUNDESREPUBLIK DEUTSCHLAND (TUEK 200) IN DER UMGESTALTUNG]
Peter J. Platt *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 84 1981 p 33-42 refs In GERMAN;

ENGLISH summary Original contains color illustrations (For primary document see N82-29643 20-42)
Avail: NTIS HC A04/MF A01

N82-29651# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
INTERACTIVE MAP PREPARATION UNDER COLOR MONITOR CONTROL WITH THE MDP SYSTEM [INTERAKTIVE KARTENBEARBEITUNG UNTER FARBMONITORKONTROLLE MIT DEM MDP-SYSTEM]
Armin Colditz *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 13-19 In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29652# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
METHODOLOGICAL PROBLEMS WITH THE AUTOMATIC DIGITIZATION OF GEOSCIENTIFIC MAPS [METHODISCHE PROBLEME BEIM AUTOMATISCHEN DIGITALISIEREN GEOWISSENSCHAFTLICHER KARTEN]
Matthias Dorn *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 21-29 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29655# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE AUTOMATIC DIGITIZATION SYSTEM FASTRAK [DAS AUTOMATISCHE DIGITALISIERUNGSSYSTEM FASTRAK]
R. I. Gallaway *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 49-52 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29658# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
AUTOMATION IN PLANNING AND MASS MEDIA CARTOGRAPHY [AUTOMATION IN DER PLANNUNGS- UND PRESSEKARTOGRAPHIE]
Tomas Kaster *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 73-81 refs In GERMAN; ENGLISH and FRENCH summaries Original contains color illustrations (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29660# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TECHNIQUES FOR CARTOGRAPHIC PRESENTATION OF ROAD NETWORKS [TECHNIKEN BEI DER KARTOGRAPHISCHEN DARSTELLUNG VON STRASSENNETZWERKEN]
Klaus Mueller *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 99-115 refs In GERMAN; ENGLISH and FRENCH summaries Original contains color illustrations (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29663# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
PRINCIPLE AND METHOD OF AUTOMATIC GENERALIZATION OF CONTOURS [PRINZIP UND METHODE DER AUTOMATISCHEN GENERALISIERUNG DER RELIEFFORMEN]
He-Hai Wu *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 163-174 refs In GERMAN; ENGLISH; FRENCH and CHINESE summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29666# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
LOOKING AFTER THE OFFICIAL CARTOGRAPHIC WORK OF THE FORMER GERMAN REICH CONCERNING TERRITORY OUTSIDE THE FEDERAL REPUBLIC OF GERMANY [DIE BETREUUNG DER AMTLICHEN KARTENWERKE DES EHEMALIGEN DEUTSCHEN REICHES FUER DAS GEBEIT AUSERHALB DER BUNDESREPUBLIK DEUTSCHLAND]
Bernhard Lindholz *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 86 1981 p 25-31 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

N82-29667# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
WORK AT THE BERLIN OFFICE ON THE 1 : 200,000 SCALE TOPOGRAPHICAL AERIAL MAP [DIE ARBEITEN DER AUSSENSTELLE BERLIN AN DER TOPOGRAPHISCHEN UEBERSICHTSKARTE 1 : 200,000]
Guenther Langkath and Gerhard Wittstock *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 86 1981 p 33-45 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

N82-29668# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE TERRITORY OF THE FEDERAL REPUBLIC OF GERMANY AS PART OF THE 1 : 1,000,000 SCALE INTERNATIONAL WORLD MAP (IWM) [DIE INTERNATIONALE WELTKARTE (IWK) 1 : 1,000,000 FUER DAS GEBEIT DER BUNDESREPUBLIK DEUTSCHLAND]
Hans Eberhard Czeczor *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 86 1981 p 47-53 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

N82-30189# Bordeaux Univ. (France). Observatoire.
ASTROMETRIC MEASUREMENTS REQUIRED BEFORE HIPPARCOS LAUNCH
Y. Requieme *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 207-209 (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N82-29708* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED INORGANIC SEPARATORS FOR ALKALINE BATTERIES Patent
Dean W. Sheibley, inventor (to NASA) Issued 25 May 1982 5 p Filed 27 Feb. 1981 Supersedes N81-22466 (19 - 13, p 1777)
(NASA-Case-LEW-13171-1; US-Patent-4,331,746; US-Patent-Appl-SN-238790; US-Patent-Class-429-144; US-Patent-Class-429-251; US-Patent-Class-429-254) Avail: US Patent and Trademark Office CSCL 10C

A flexible, porous battery separator comprising a coating applied to a porous, flexible substrate is described. The coating comprises: (1) a thermoplastic rubber-based resin which is insoluble and unreactive in the alkaline electrolyte; (2) a polar organic plasticizer which is reactive with the alkaline electrolyte to produce a reaction product which contains a hydroxyl group and/or a carboxylic acid group; and (3) a mixture of polar particulate filler materials which are unreactive with the electrolyte, the mixture comprising at least one first filler material having a surface area of greater than 25 meters sq/gram, at least one second filler material having a surface area of 10 to 25 sq

meters/gram, wherein the volume of the mixture of filler materials is less than 45% of the total volume of the fillers and the binder, the filler surface area per gram of binder is about 20 to 60 sq meters/gram, and the amount of plasticizer is sufficient to coat each filler particle. A method of forming the battery separator is also described.

Official Gazette of the U.S. Patent and Trademark Office

N82-29709* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

METHOD OF MAKING A HIGH VOLTAGE V-GROOVE SOLAR CELL Patent

John C. Evans, Jr., An-Ti Chai, and Chandra P. Goradia, inventors (to NASA) Issued 22 Jun. 1982 6 p Filed 24 Dec. 1980 Supersedes N81-16529 (19 - 07, p 0927)

(NASA-Case-LEW-13401-1; US-Patent-4,335,503; US-Patent-Appl-SN-219678; US-Patent-Class-29-572; US-Patent-Class-136-249; US-Patent-Class-148-1.5; US-Patent-Class-357-30) Avail: US Patent and Trademark Office CSCL 10A

A method is provided for making a high voltage multijunction solar cell. The cell comprises a plurality of discrete voltage generating regions, or unit cells, which are formed in a single semiconductor wafer and are connected together so that the voltages of the individual cells are additive. The unit cells comprise doped regions of opposite conductivity types separated by a gap. The method includes forming V-shaped grooves in the wafer and thereafter orienting the wafer so that ions of one conductivity type can be implanted in one face of the groove while the other face is shielded. A metallization layer is applied and selectively etched away to provide connections between the unit cells. Official Gazette of the U.S. Patent and Trademark Office

N82-29710* National Aeronautics and Space Administration. Pasadena Office, Calif.

SOLID ELECTROLYTE CELL Patent

Robert Richter, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 25 May 1982 6 p Filed 24 Dec. 1980 Supersedes N81-16385 (19 - 07, p 0907) Sponsored by NASA

(NASA-Case-NPO-15269-1; US-Patent-4,331,742; US-Patent-Appl-SN-220214; US-Patent-Class-429-33; US-Patent-Class-429-40; US-Patent-Class-429-193; US-Patent-Class-204-290R; US-Patent-Class-204-290F) Avail: US Patent and Trademark Office CSCL 10C

A solid electrolyte cell including a body of solid ionized gas-conductive electrolyte having mutually spaced surfaces and on which is deposited a multiplicity of mutually spaced electrodes is described. Strips and of bare substances are interposed between electrodes, so that currents of ionic gas may be established between the electrodes via the bare strips, whereby electrical resistance for the cells is lowered and the gas conductivity is enhanced.

Official Gazette of the U.S. Patent and Trademark Office

N82-29711 British Library Lending Div., Boston Spa (England).

STATE OF AND PROSPECTS FOR AUTOMATION OF ENERGY-SUPPLY SOURCES OF IRON AND STEEL INDUSTRY ENTERPRISES

G. Ya. Kryukov, R. V. Lyambakh, L. E. Lyashenko, and A. D. Sergeev 5 Jul. 1982 8 p Transl. into ENGLISH from Stal (USSR), v. 4, 1981 p 93-95

(BLLD-M-26558-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

Automation at various levels of items of the energy management of enterprises belonging to the iron and steel industry is considered in the light of recent developments and the energy-supply situation as a whole. Examples of benefits obtained through automation are given. Author

N82-29712# Regensburg Univ. (West Germany).

WIND TURBINE VALUE ANALYSIS FOR ELECTRIC UTILITIES

W. Dub Jun. 1982 20 p refs Sponsored by International Energy Agency

Avail: NTIS HC A02/MF A01

A methodology for the analysis of the value of large-scale wind turbines to electric utilities, and its application to utility, socioeconomic and meteorological data in two case studies is described. The value analysis was carried out for the year of reference 1985 and included different levels of wind turbine penetration. Results of the value analysis are given. The utility planning procedures in current use and the unique problems of the integration of wind power into the power system are discussed. Observations and conclusions regarding the current and future potential of wind power for utilities are presented. Author

N82-29713*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

VERTICAL SHAFT WINDMILL Patent Application

David C. Grana and Spencer V. Inge, Jr., inventors (to NASA) Filed 28 May 1982 8 p

(NASA-Case-LAR-12923-1; US-Patent-Appl-SN-383063) Avail: NTIS HC A02/MF A01 CSCL 10A

A vertical shaft windmill that automatically controls its maximum rotational speed in high winds is disclosed. Several equally spaced blades are mounted on the vertical shaft. Each blade consists of an inboard section attached to the shaft and an outboard section skew hinged to the inboard section. The outboard sections automatically adjust their positions with respect to the fixed inboard sections with changes in velocity of the relative wind. When the wind reaches a certain velocity the inboard sections and the outboard sections form flat surfaces. Hence, any further increase in the wind velocity will not increase the rotational speed of the shaft. With the outboard sections in downward positions any abrupt changes in wind will move most of the outboard sections upward releasing part of the load and protecting the windmill. NASA

N82-29714*# National Aeronautics and Space Administration. Pasadena Office, Calif.

SALTLESS SOLAR POND Patent Application

Edward I. H. Lin, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Filed 28 May 1982 24 p

(Contract NAS7-100)

(NASA-Case-NPO-15808-1; US-Patent-Appl-SN-383068) Avail: NTIS HC A02/MF A01 CSCL 10A

A specifically-designed honeycomb structure is placed on the surface permits penetration of short wave solar radiation into the water, but efficiently insulates the resulting heated body of water from losing heat to the atmosphere by conduction, convection or infrared radiation. The honeycomb structure includes several honeycomb panels which are mounted adjacent to one another in a modular fashion to float on the surface of the water. Each honeycomb panel includes a multitude of honeycomb cells having a height-to-width or aspect ratio of at least approximately 14 to 1. The honeycomb cells effectively suppress convection of air in the panels. A radiation shield, comprising a cross-plate mounted substantially in the midsection of each cell, significantly reduces heat losses by infrared radiation. NASA

N82-29715*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

RETROFIT ENERGY CONSERVATION IN RESIDENTIAL BUILDINGS IN SOUTHERN CALIFORNIA

Robert H. Turner, Gajanana C. Birur, and Cedric Daksla 15 Jun. 1982 43 p refs Sponsored by NASA and Southern California Edison Co.

(NASA-CR-169137; JPL-Publ-82-55; NAS 1.26:169137) Avail: NTIS HC A03/MF A01 CSCL 10A

The common energy conservation techniques (ECTs) that can be retrofit-installed into residential buildings are surveyed. The quantity of saved energy for heating and cooling attributable to each ECT is evaluated for three common modes of heating: natural gas heating at 60¢/therm; heating via heat pump at $1.20/therm; and electric resistance heating at $2.40/therm. In every case, a life cycle cost comparison is made between the long term revenue due to energy conservation and a safe and conventional alternative investment that might be available to the prudent homeowner. The comparison between investment in an ECT and the alternative investment is brought into perspective using the life cycle payback period and an economic Figure of Merit (FOM). The FOM allows for relative ranking between candidate ECTs. Because the entire spectrum of winter heating climates in California is surveyed, the decision maker can determine whether or not a considered ECT is recommended in a given

climate, and under what conditions an ECT investment becomes attractive. J.M.S.

N82-29716*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANALYSIS AND DESIGN OF A 10 TO 30 kW GRID-CONNECTED SOLAR POWER SYSTEM FOR THE JPL FIRE STATION AND FIRST AID STATION
Robert H. Josephs 15 Apr. 1982 57 p refs Sponsored in part by NASA
(Contract NAS7-100; Contract DE-AI01-80CS-30507)
(NASA-CR-169157; JPL-Publ-82-51; NAS 1.26:169157) Avail: NTIS HC A04/MF A01 CSCL 10B

The design and performance of a modestly sized utility-connected power conditioning system and its supporting photovoltaic collector are described and estimated. Utility preparations and guidelines to conform with the output of a small generating station with that of a large power network are examined. Author

N82-29717*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TECHNIQUES FOR ENHANCING DURABILITY AND EQUIVALENCE RATIO CONTROL IN A RICH-LEAN, THREE-STAGE GROUND POWER GAS TURBINE COMBUSTOR
Donald F. Schultz 1982 14 p refs Presented at 1982 Joint Power Generation Conf., Denver, 17-21 Oct. 1982; sponsored by ASME
(Contract DE-AI01-77ET-10350)
(NASA-TM-82922; DOE/NASA/10350-33-E-1313; NAS 1.15:82922) Avail: NTIS HC A02/MF A01 CSCL 10A

Rig tests of a can-type combustor were performed to demonstrate two advanced ground power engine combustor concepts: steam cooled rich-burn combustor primary zones for enhanced durability; and variable combustor geometry for three stage combustion equivalence ratio control. Both concepts proved to be highly successful in achieving their desired objectives. The steam cooling reduced peak liner temperatures to less than 800 K. This offers the potential of both long life and reduced use of strategic materials for liner fabrication. Three degrees of variable geometry were successfully implemented to control airflow distribution within the combustor. One was a variable blade angle axial flow air swirler to control primary airflow while the other two consisted of rotating bands to control secondary and tertiary or dilution air flow. B.W.

N82-29718*# Institute of Gas Technology, Chicago, Ill. Engineering Research Div.
STABILIZING PLATINUM IN PHOSPHORIC ACID FUEL CELLS Final Report, Dec. 1980 - Mar. 1982
Robert J. Remick Jul. 1982 47 p refs
(Contracts DEN3-208; DE-AI01-80ET-17088)
(NASA-CR-165606; DOE/NASA/0208-4; NAS 1.26:165606; Rept-61051) Avail: NTIS HC A03/MF A01 CSCL 10A

Platinum sintering on phosphoric acid fuel cell cathodes is discussed. The cathode of the phosphoric acid fuel cell uses a high surface area platinum catalyst dispersed on a conductive carbon support to minimize both cathode polarization and fabrication costs. During operation, however, the active surface area of these electrodes decreases, which in turn leads to decreased cell performance. This loss of active surface area is a major factor in the degradation of fuel cell performance over time. S.L.

N82-29719*# California Univ., Berkeley. Legal Inst.
CURRENT LEGAL AND INSTITUTIONAL ISSUES IN THE COMMERCIALIZATION OF PHOSPHORIC ACID FUEL CELLS Final Report
John T. Nimmons, Kevin D. Sheehy, Joel R. Singer, and Tom C. Gardner Jan. 1982 238 p refs
(Grant NAG3-111; Contract DE-AI01-80ET-17088)
(NASA-CR-167867; DOE/NASA/0111-1; NAS 1.26:167867) Avail: NTIS HC A11/MF A01 CSCL 10A

Legal and institutional factors affecting the development and commercial diffusion of phosphoric acid fuel cells are assessed. Issues for future research and action are suggested. Perceived barriers and potential opportunities for fuel cells in central and dispersed utility operations and on-site applications are reviewed, as well as the general concept of commercialization as applied to emerging energy technologies. Author

N82-29720*# DHR, Inc., Washington, D.C.
APPLICATION OF PHOTOVOLTAIC ELECTRIC POWER TO THE RURAL EDUCATION/COMMUNICATION NEEDS OF DEVELOPING COUNTRIES Final Report
Anil Cabraal, David Delansanta and George Burrill Jul. 1982 61 p ref Prepared in cooperation with Associates in Rural Development, Inc., Burlington, Vt. Sponsored in part by Agency for International Development
(Contract DEN3-248)
(NASA-CR-167894; NAS 1.26:167894) Avail: NTIS HC A04/MF A01 CSCL 10B

The suitability (i.e., cost competitiveness and reliability) of photovoltaic (PV) power systems for rural applications in developing countries is considered. Potential application sectors include health delivery, education and communication where small amounts of electricity are needed to meet critical needs. Author

N82-29721*# Aerospace Corp., El Segundo, Calif.
ENVIRONMENTAL ASSESSMENT OF THE 40 KILOWATT FUEL CELL SYSTEM FIELD TEST OPERATION Final Report
Gary Bollenbacher May 1982 160 p refs
(Contract DE-A101-80ET-17088; NASA Order C-42701D)
(DOE/NASA/27301-1; NASA-CR-167923) Avail: NTIS HC A08/MF A01 CSCL 10A

This environmental assessment examines the potential environmental consequences, both adverse and beneficial, of the 40 kW fuel cell system system field test operation. The assessment is of necessity generic in nature since actual test sites were not selected. This assessment provides the basis for determining the need for an environmental impact statement. In addition, this assessment provides siting criteria to avoid or minimize negative environmental impacts and standards for determining candidate test sites, if any, for which site specific assessments may be required. S.L.

N82-29722*# Hughes Research Labs., Malibu, Calif.
MEDIUM ENERGY PROTON RADIATION DAMAGE TO (AlGa)As-GaAs SOLAR CELLS Final Report, 8 Aug. 1979 - 1 May 1982
R. Y. Loo, G. S. Kamath, and R. C. Knechtli Jul. 1982 93 p refs
(Contract NAS1-15926)
(NASA-CR-165946; NAS 1.26:165946) Avail: NTIS HC A05/MF A01 CSCL 10A

The performance of (AlGa)As-GaAs solar cells irradiated by medium energy 2, 5, and 10 MeV protons was evaluated. The Si cells without coverglass and a number of GaAs solar cells with 12 mil coverglass were irradiated simultaneously with bare GaAs cells. The cell degradation is directly related to the penetration of depth of protons with GaAs. The influence of periodic and continuous thermal annealing on the GaAs solar cells was investigated. N.W.

N82 29723*# ARCO Solar, Inc., Chatsworth, Calif.
AUTOMATED SOLAR PANEL ASSEMBLY LINE Final Report
Howard Somberg May 1981 101 p Sponsored in part by DOE; prepared for JPL
(Contracts NAS7-100; JPL-955278)
(NASA-CR-169206; DOE/JPL-955278-81/5; NAS 1.26:169206) Avail: NTIS HC A06/MF A01 CSCL 10A

The initial stage of the automated solar panel assembly line program was devoted to concept development and proof of approach through simple experimental verification. In this phase, laboratory bench models were built to demonstrate and verify concepts. Following this phase was machine design and integration of the various machine elements. The third phase was machine assembly and debugging. In this phase, the various elements were operated as a unit and modifications were made as required. The final stage of development was the demonstration of the equipment in a pilot production operation. Author

N82-29724*# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.
PROCESSED-INDUCED DEFECTS IN EFG RIBBONS
B. Cunningham and D. G. Ast May 1982 14 p refs Sponsored in part by DOE Prepared for JPL
(Contract JPL-956046)
(NASA-CR-169205; DOE/JPL-956046-82/3; NAS 1.26:169205; Rept-4) Avail: NTIS HC A02/MF A01 CSCL 10A

The defect structure of processed edge defined film-fed growth (EFG) silicon ribbons was studied using a variety of electron microscopic techniques. Comparison between the present results and previous studies on as-grown ribbons has shown that solar cell processing introduces additional defects into the ribbons. The creation of point defects during high temperature phosphorus diffusion induces dislocation climb, resulting in the formation of dislocation helices in the diffused layer. B.W.

N82-29725# Army Engineer District, Louisville, Ky.
STAGE 2 HYDROPOWER STUDY: CAGLES MILL LAKE, INDIANA
Jul. 1981 51 p refs
(AD-A112150) Avail: NTIS HC A04/MF A01 CSCL 10/2

The principle planning objective was the development of a renewable resource energy production facility for Cagles Mill Lake and the surrounding study area to be of benefit for a 100-year period of analysis. All plans studied are economically infeasible due primarily to the cost of the conveyance system needed to deliver the water to the powerhouse. The maximum capability of a house power unit in the center gate opening of the control tower is almost 250 KW. It is recommended that the study of the feasibility of small scale hydropower at Cagles Mill Lake, Indiana be terminated. It is recommended that a small station power unit, having an installed capacity of about 250 KW, be designed and installed in the existing tower at the earliest possible date to provide power for project facilities. Author (GRA)

N82-29726# Naval Surface Weapons Center, White Oak, Md. Research and Technology Dept.
COMPARISON OF ANODIC DISCHARGABILITY OF Li-B ALLOY WITH PURE Li IN LiCl OSUB4 PROPYLENE CARBONATE Final Report, 1977 - 1979
S. D. James Apr. 1981 27 p refs
(ZR00001; AR01301)
(AD-A114542; AD-F500015; NSWC/TR-81-155) Avail: NTIS HC A03/MF A01 CSCL 10/3

Li-B alloy discharges comparably with pure Li in PC-LiClO sub 4 and 23 deg C. The alloy may find useful application where safety considerations permit sacrificing some coulombic capacity versus unsupported Li. Measurement of electrochemical Li utilization suggests the alloy is a mixture of elemental Li plus a Li-B compound whose stoichiometry is in the vicinity of 'Li sub 7 B sub 6' GRA

N82-29727# Teknologisk Inst., Tastrup (Denmark).
SOLAR HEATING SYSTEM IN BLOVSTROED. THE 2 1/2 YEAR MEASUREMENTS OF A 10m(2) HOT WATER SYSTEM
Benny Boehm and Peter Steensen May 1981 41 p refs In DANISH
(DE82-901187; NP-2901187) (US Sales Only) HC A03/MF A01; DOE Depository Libraries

The experimental solar water heating system in Blovstroed (Denmark) was tested. The heat losses from the storage tank and piping were about twice as large as planned. The practical hot water consumption was smaller than planned. The solar collector itself had some insignificant damages and some rust on the absorber. The net yield was 692 kWh with water consumption about 1278 kWh. A new system based on experience of that from Blovstroed is expected to yield 390 kWh/sq m solar collector (5 times better performance). DOE

N82-29728# Styrelsen foer Teknisk Utveckling, Stockholm (Sweden).
LONGTIME CYCLING TEST OF A SALTMELT HEAT STORE BASED ON CALCIUM CHLORIDE
Janos Hetenyi, Geron Johansson, and Knut-Olof Lagerkvist 1981 18 p refs In SWEDISH
(DE82-900881; SP-RAPP-1981-12; STU-79-6324) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

A long time test of the Thermol 81 Energy Storage rods is reported. The plastic rods containing CaCl2 x 6H2O passed through 1000 eight hour cycles with 60 C and 10 C as temperature extremes. The thermal storage capacity of tested rods did not deteriorate appreciable during the test period, nor was the crystal structure significantly changed. DOE

N82-29729# Styrelsen foer Teknisk Utveckling, Stockholm (Sweden).
PRE-PROJECT: ENERGY OUT OF LIQUID MANURE. EXTRACTION OF HEAT OUT OF AN AEROBIC, WET PROCESS OF COMPOSTING IN ORDER TO HEAT TWO MANSIONS
Kjell-Ake Pettersson Mar. 1981 48 p refs In SWEDISH
(DE82-900991; STU-80-4784) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

The conditions for the construction of an economical plant of wet composting are considered. Eleven cu. m. oil were saved when 90,000 SEK were invested. By means of a heat pump the temperature was increased to 600 C. The properties of the manure are improved which simplifies the subsequent handling. DOE

N82-29730# Arizona Univ., Tucson. Optical Sciences Center.
CHEMICAL VAPOR DEPOSITION OF AMORPHOUS SILICON FOR PHOTOTHERMAL SOLAR-ENERGY CONVERTERS Final Report, 1 May 1978 - 30 Apr. 1981
B. O. Seraphin May 1981 63 p refs
(Contract ER-78-S-02-4899)
(DE82-005290; DOE/ER-04899/T1) Avail: NTIS HC A04/MF A01

The chemical vapor deposition (CVD) of amorphous silicon alloys of sufficient solar absorptance and long time stability at temperatures in excess of 5000 C is studied. Deposited onto a substrate layer of high infrared reflectance such as CVD molybdenum, a reflector absorber tandem of good spectral selectivity for high temperature photothermal solar energy conversion results that can economically be fabricated in a flow through process was tested at 5000 C in vacuum. The role of the alloying atoms in determining the thermal stability and the optical properties of a noncrystalline material was also investigated. DOE

N82-29731# GTE Labs., Inc., Waltham, Mass.
DEVELOPMENT OF MATERIALS FOR A LUMINESCENT SOLAR COLLECTOR Annual Progress Report, 1 Sep. 1979 - 31 Dec. 1980
A. Lempicki, L. Andrews, and B. C. McCollum 1981 29 p refs
(Contracts ER-78-C-02-4996; DE-AC02-78ER-04996)
(DE82-007518; DOE/ER-04996/2) Avail: NTIS HC A03/MF A01

Progress is reported in research of inorganic fluorescent materials for application as flat panel luminescent solar collectors. Efforts were concentrated on luminescent metal ions doped into glasses. The spectroscopic and photophysical properties of Cr(3+) in glasses were examined. Sensitization of Nd(3+) by codoping with Cr(3+) is discussed. The Cr(3) to Nd(3+) energy transfer was characterized in lithium lime silicate and aluminum phosphate glasses as a function of active ion densities. DOE

N82-29732# Arizona Solar Energy Commission, Phoenix. Geothermal Commercial Team.
GEOTHERMAL DEVELOPMENT PLAN: PIMA COUNTY
Don H. White 1981 51 p refs Prepared in cooperation with Arizona Univ.
(Contract DE-FC03-80RA-50076)
(DE82-006759; DOE/RA-50076/T12) Avail: NTIS HC A04/MF A01

Geothermal development for Pima County which is located entirely within the Basin and Range physiographic province in which geothermal resources are known to occur was investigated. Continued growth as indicated by such factors as population growth, employment and income will require large amounts of energy. Geothermal energy can provide some of the energy that

will be needed. Potential users of geothermal energy within the county are identified. DOE

N82-29733# Booz-Allen and Hamilton, Inc., Bethesda, Md.
SOLAR CENTRAL RECEIVERS: THE TECHNOLOGY, INDUSTRY, MARKETS, AND ECONOMICS
1 Sep. 1981 68 p
(Contract DE-AC03-81SF-11436)
(DE82-005296; DOE/SF-11436/1-Exec-Summ) Avail: NTIS HC A04/MF A01

Solar central receiver (SCR) technologies are described and compared briefly with other solar thermal technologies. Divergence in the capabilities of SCR technical options and the fact that no single SCR technology has emerged as the best technology for all applications are discussed. The necessity for continued technical development of both components and systems is presented. The geographic segmentation of the addressable market for SCR technology is considered. Economics and market factors favorable to adoption of SCR technology in the mid-1990's are described. The ways the competitive economics of SCR technology and its adoption rate in the market place can be improved with the implementation of specific federal programs are pointed out. The ways a cohesive federal program can serve to advance the date of free market competition and create a sustainable SCR industry are discussed. DOE

N82-29734# Department of Energy, Washington, D. C.
FEDERAL ENERGY R AND D PRIORITIES. REPORT OF THE RESEARCH AND DEVELOPMENT PANEL, ENERGY RESEARCH ADVISORY BOARD
Nov. 1981 82 p
(DE82-007065; DOE/TIC-2007065) Avail: NTIS HC A05/MF A01

An assessment of the US Department of Energy's major program areas is presented. This assessment features an evaluation technique in which each member evaluated 49 program areas covering all DOE energy R and D programs in terms of seven criteria for energy supply and conservation programs and five criteria for science and technology base programs. Each member evaluated the relative importance of these criteria and judged whether more, less, or the same amounts of money relative to the President's request for FY 1982 should be allocated to the various programs. The judgements of the members were combined numerically to arrive at figures of merit for each program on the relative priorities of energy technologies and whether financial allocations to each program should be increased, held the same or decreased relative to the President's request for FY 1982. The resulting figure of merit was used to rank the programs in order of importance. Criteria used in evaluating the priority of each technology were selected and the definitions for each criterion agreed upon were technology potential, urgency, economic potential, benefit/cost, energy/national security, health/safety/environment, and Federal RD and D role. The criteria for the science and technology base programs were scientific potential, risk/benefit, mission impact, urgency and federal role. A detailed definition of these criteria is given. DOE

N82-29735# Center for the Environment and Man, Inc., Hartford, Conn.
VISCOSITY-STABILIZED SOLAR PONDS Final Report
7 Aug. 1981 53 p refs
(Contract DE-AC02-76CS-32980)
(DE82-007513; DOE/CS-32980/T1; DOE-FR04200-4) Avail: NTIS HC A04/MF A01

Work previously completed on polymer stabilized solar ponds is described. A detailed outline is provided of work proposed to expand upon and complete the work and to determine the feasibility, both technical and economic, of a polymer stabilized solar pond. Information is presented on the polymers that have been reported in the literature and by the manufacturer of the polymer Carbopol. Proposed management and schedules and descriptions of the proposed personnel and facilities are included. Some candidate organic materials are described. Data relating to solar input, the relationship between the total energy available, the requirements for domestic heat, and present preliminary design ideas are discussed. DOE

N82-29736# Gruy Federal, Inc., Arlington, Va.
POTENTIAL FOR SUBSTITUTION OF GEOTHERMAL ENERGY AT DOMESTIC DEFENSE INSTALLATIONS AND WHITE SANDS MISSILE RANGE
Charles A. Bakewell and Joel L. Renner Jan. 1982 146 p refs
(Contract DE-AC08-80NV-10072)
(DE82-007081; DOE/NV-10072/4) Avail: NTIS HC A07/MF A01

Geothermal resources that can provide substitute energy at defense installations are identified and evaluated. The geologic characteristics and related economics of potential geothermal resources located at or near the installations were estimated. The geologic assessment identified installations with possible geothermal resources and Atlantic coastal plain resource configurations that represented the alternatives available to east coast bases. These locations and resource configurations, were examined to determine the relative economics of substituting potential geothermal energy for part or all of the existing oil, gas, and electrical energy usage. DOE

N82-29737# San Bernardino West Side Community Development Corp., Calif.
THE 35 KILOWATT PEAK PHOTOVOLTAIC POWER SYSTEM, PHASE 1 Final Report
M. L. Stary and Dwane Burgess Nov. 1981 108 p
(Contract DE-AC04-76DP-00789)
(DE82-005714; SAND-81-7035) Avail: NTIS HC A06/MF A01

A 35 kilowatt peak photovoltaic power system is being implemented at a new industrial park in the city of San Bernardino, California. Phase I of this program includes the establishment and operation of a test station to obtain site specific weather data and to operate three types of photovoltaic arrays, fixed flat plate, tracking flat plate and concentrator, and system analysis and design o the Phase II, 35 kilowatt peak power system for installation on the roof of an 18,000 square foot, light manufacturing facility. An important aspect of the program is the establishment of a training and safety program to acquiant unskilled, minority workers with the operation and maintenance of photovoltaic power systems. The results of the Phase I activity are presented. DOE

N82-29738# Westinghouse Research and Development Center, Pittsburgh, Pa.
DEVELOPMENT OF COPPER SULFIDE/CADMIUM SULFIDE THIN-FILM SOLAR CELLS Technical Progress Report, 13 Jul. 1980 - 12 Oct. 1980
J. R. Szedon, W. J. Biter, J. A. Abel, and H. C. Dickey 5 Nov. 1981 15 p refs
(Contract DE-AC02-77CH-00178)
(DE82-005255; SERI/PR-8143-1-T4; TPR-5) Avail: NTIS HC A02/MF A01

The accuracy of substrate temperature control during CdS deposition was achieved by welding thermocouples to a molybdenum foil tab which was subsequently welded to the copper foil substrate. Structural features of the CdS films were consistent with control of the substrate temperature at 2200 C. Direct measurement of optical and electronic properties of the Cu2S films used in cells requires removal of the copper foil substrate for optical transmission characterization. Simple etching of a window in the substrate is not acceptable since the CdS film cracks around the periphery of the window. Encouraging cell performance results were obtained with evaporated grids which consisted of two layers: a thin layer of either gold (840A) or copper (60A) on the Cu2S surface and a 2.5 (SIGMA)m thick overlayer of lead. DOE

N82-29739# Ames Lab., Iowa.
PHOTOELECTROCHEMICAL SOLAR CELLS BASED ON d-BAND ELECTROCHEMISTRY AT TRANSITION METAL DISELENIDES Final Report
Bruce A. Parkinson, K. K. Kam, G. Kline, and C. Levy Nov. 1981 77 p refs
(Contracts W-7405-eng-82; EG-77-C-01-4042)
(DE82-006217; IS-4784) Avail: NTIS HC A05/MF A01

The photoelectrochemical behavior of synthetic crystals of WS2, MoS2 and crystals with mixed metal and chalcogen

composition was studied and compared with the behavior of MoSe2 and WSe2. The composition and stoichiometry of the crystals and the composition of the electrolyte were varied and the behavior of the materials in a regenerative liquid junction solar cell was measured and analyzed. The quantum yields as a function of wavelength and photon flux were investigated and sunlight to electricity conversion efficiencies were measured. The formation of iodine layers on the photoelectrode surface under high illumination intensity was observed and discussed with respect to the use of these materials with solar concentrators. Various configurations for photoelectrochemical photovoltaic solar cells are reviewed and evacuated. Both flat plate cells and cells with moderate light concentration are examined. Several novel systems where the electrolyte plays a role in light concentration are proposed. DOE

N82-29740# United Technologies Corp., South Windsor, Conn. Fuel Cell Operations Dept.
SPECIFICATION FOR DISPERSED FUEL-CELL GENERATOR
L. M. Handley and R. Cohen Nov. 1981 100 p
(EPRI Proj. 1777-1)
(DE82-901284; EPRI-EM-2123) Avail: NTIS HC A05/MF A01

A general description and performance definition for a standard 11-mw fuel cell power plant designed for electric utility dispersed-generation applications are provided. Additional features available at the option of the purchaser are also described. The power plant can operate singly or grouped with other power plants to produce larger mutli-megawatt power stations. A 33-mw station is discussed as representative of multiple power plant installations. The power plant specification defines power rating, heat rate, fuels, operating modes, siting characteristics, and available options. A general description included in the attachments covers equipment, typical site arrangement, auxiliary subsystems, maintenance, fuel flexiability, and general fluid and electrical schematics. DOE

N82-29741# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
DEVELOPMENT OF COPPER SULFIDE/CADMIUM SULFIDE THIN-FILM SOLAR CELLS Technical Progress Report, 13 Oct. 1980 - 12 Jan. 1981
J. R. Szedon, H. C. Dickey, J. A. Abel, and W. J. Biter 5 Nov. 1981 43 p refs
(Contract DE-AC02-77CH-00178)
(DE82-005254; SERI/PR-8143-1-T5; TPR-6) Avail: NTIS HC A03/MF A01

Means were explored to better control wet-chemistry conditions attending formation of the Cu2S layer on CdS-based solar cells. Dilution of active solutions in contact with the Cu2S layer results in poorer cell performance. Use of an argon gas knife to dray the cell surface after etching, barrier formation, and rinsing allows greater control of process conditions and gives good cell results. Electroplating offers a promising low-cost alternative to evaporation of gold-grid electrodes. Cells with plated grids were significantly higher in efficiency than control cells with evaporated grids. DOE

N82-29742# Automation Industries, Inc., Silver Spring, Md. Vitro Labs. Div.
CORROSION AND SCALING IN SOLAR HEATING SYSTEMS
Roy J. Foresti, Jr. Dec. 1981 38 p refs
(Contract DE-AC01-79CS-30027)
(DE82-006139; SOLAR/0909-81/70) Avail: NTIS HC A03/MF A01

Corrosion, as experienced in solar heating systems, is described in simplistic terms to familiarize designers and installers with potential problems and their solutions. The role of a heat transfer fluid in a solar system is briefly discussed, and the choice of an aqueous solution is justified. The complexities of the multiple chemical and physical reactions are discussed in order that uncertainties of corrosion behavior can be anticipated. Some basic theories of corrosion are described, aggressive environments for some common metals are identified, and the role of corrosion inhibitors is delineated. The similarities of thermal and material characteristics of a solor system and an automotive cooling system are discussed. Based on the many years of experience with corrosion in automotive systems, it is recommended that similar antifreezes and corrosion inhibitors should be used in solar systems. The importance of good solar system design and fabrication is stressed and specific characteristics that affect corrosion are identified. DOE

N82-29743# Bechtel Corp., San Francisco, Calif.
ENERGY-SUPPLY PLANNING-MODEL DOCUMENTATION. VOLUME 1: USER MANUAL Final Report
Sep. 1981 471 p Prepared for Brookhaven National Lab.
(Contract DE-AC02-76CH-00016)
(DE82-006285; BNL-30278-Vol-1) Avail: NTIS HC A20/MF A01

The model modified to address issues of importance to energy planning for developing countries and has been adapted for use in studies for Egypt, Indonesia, Peru, Portugal and South Korea. Computer programs were developed to assist in the adaptation process. The characteristics of the ESPM model are given. The information required to make ESPM applications once the model has been made operational on a computer system is provided. An overview of all the ESPM subprograms, including descriptions of the functions and application of each subprogram is provided. Data input forms, a detailed description of each input, and sample run decks and reports for each subprogram are included. DOE

N82-29744# Concentration Specialists, Inc., Andover, Mass.
TESTING A DIRECT-CONTACT CRYSTALLIZER FOR COLD THERMAL ENERGY STORAGE USING SODIUM SULFATE Final Report
Oct. 1981 37 p refs
(Contract DE-AC03-78ET-11347)
(DE82-001985; DOE/ET-11347/T1) Avail: NTIS HC A03/MF A01

Thermal energy storage systems have the potential permitting more economical and efficient use of intermittent energy sources and off-peak electrical power for applications where energy supply and demand do not coincide. One such application is space cooling of residential buildings. This program investigated a novel approach to an aqueous sodium sulfate system wherein water evaporating directly from the salt solution provides the cooling. A circulation pump outiside the combination crystallizer-thermal energy storage tank discharges through nozzles inside the tank to maintain agitation of the crystal slurry. The concept was evaluated analytically and tested experimentally. DOE

N82-29745# Brookhaven National Lab., Upton, N. Y. Center for Analysis of Energy Systems.
BREAKEVEN COSTS OF STORAGE IN OPTIMIZED SOLAR ENERGY SYSTEMS
R. W. Leigh Sep. 1981 36 p refs
(Contract DE-AC02-76CH-00016)
(DE82-006967; BNL-51428) Avail: NTIS HC A03/MF A01

The results of an analysis of the breakeven cost, or value, of energy storage to solar energy systems are described. It is shown that the value of storage depends strongly both on solar fraction of the solar energy system in which the storage is employed, and on the cost of the collectors used in the system. Various strategies for dealing with this ambiguity are presented, and it is shown that for a broad class of technically and economically practical solar energy systems, storage costs need only be low enough to make a system employing very small amounts of storage practical. Reductions in cost of collectors will thereafter produce greater reductions in the total system costs or provide greater fuel displacement at constant total system cost than will reductions in the cost storage, within limits discussed. DOE

N82-29746# RCA Labs., Princeton, N. J. Display and Energy Systems Research Lab.
AMORPHOUS SILICON SOLAR CELLS Quarterly Report, 1 Jan. - 31 Mar. 1981
D. E. Carlson, R. S. Crandall, J. Dresner, D. Goldstein, J. J. Hanak, A. R. Moore, R. E. Schade, D. L. Staebler, H. A. Weakliem, and R. Williams May 1981 71 p refs Sponsored in part by Midwest Research Inst.
(Contract DE-AC02-77CH-00178)
(DE81-030278; SERI/PR-0-9372-2; QR-2) Avail: NTIS

HC A04/MF A01

The photoconductive response of Schottky-barrier and p-i-n solar cell structures was analyzed. It shows that the photoconductivity determines the fill factor, rather than the dark current, as in crystalline silicon cells. An analysis of the I-V curves of p-i-n cells shows that the electron and hole drift lengths are comparable. High conductivity p and n type films (sigma = 1-10 (LAMBDA) (+1).cm(+1)) were produced in an rf discharge for T/sub s/ 4000 C and in a dc cathodic discharge for T/sub s/ > 3500 C. Diffusion lengths of approx. 0.8 (SIGMA)m were measured in undoped a-Si:H films at illumination levels of approx. 0.1 Sun. The activation energy of the diffusion length is 0.28 eV. The technique for measuring the diffusion length was improved by a liquid Schottky-barrier contact. It is confirmed that carbon alloying of the p layer improves the performance of p-i-n cells illuminated through that layer and also that the stability is better for cells illuminated through the p layer. It is indicated that a major factor determining the efficiency of ITO/n-i-p cells is the ITC/n contact. Several parameters were determined that affect device stability. A gradual boron profile enhances stability, as does a thin, undoped layer. Increased oxygen contamination increases the degradation of a-Si:H p-i-n cells. DOE

N82-29747# Massachusetts Inst. of Tech., Cambridge.
SOLAR PHOTOVOLTAIC/THERMAL (HYBRID) ENERGY PROJECT Final Report
Duncan B. Sheldon Sep. 1981 105 p refs
(Contract DE-AC02-77CS-34577)
(DE82-006200; DOE/CS-34577/T2; COO-4577-11) Avail: NTIS HC A06/MF A01

Development of photovoltaic/thermal (PV/T) collectors and residential heat pump systems is reported. Candidate collector and residential heat pump systems were evaluated using the TRNSYS computer program. It is found that combined heat pump and PV array is a promising method for achieving economical solar cooling. Where the cooling load is dominant, exclusively PV collectors rather than PV/T collectors are preferred. Where the heating load is dominant, the thermal component of PV/T collectors makes a significant contribution to heating a residence. PV/T collectors were developed whose combined efficiency approaches the efficiency of a double glazed, exclusively thermal collector. The design and operational problems of air source heat pumps are reviewed. Possible effects of compressor startup transients on PV power system operation are discussed. DOE

N82-29748# Delaware Univ., Newark. Inst. of Energy Conversion.
IMPROVED AMORPHOUS Si SOLAR CELLS Quarterly Progress Report, 1 Nov. 1980 - 1 Feb. 1981
V. L. Dalal Oct. 1981 26 p refs Sponsored by SERI
(Contract DE-AC02-77CH-00178)
(DE82-004714; SERI/PR-9195-1-T2) Avail: NTIS HC A03/MF A01

The growth of F-etched a-Si films is reported. Auger emission spectroscopy reveals that F concentration in these films is below the detection limit. High conductivity is reportldly obtained in both cathodic and anodic films. A model and supporting experimental data that suggest that a-Si films deposited from (SiF4 + H2) mixtures are subjected to strong ionic etching during growth are presented. A systematic study of electron drift mobilities. Fabrication of a-Si:H solar cells with high internal currents is reported. High open-circuit voltages are reported, as well as an efficiency of 3.6% on 0.24 sq c, area. A technique was developed for studying the mobility x lifetime products for monority and majority carriers in a-Si:H devices using the quantum efficiency. DOE

N82-29749# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
LABORATORY EXPERIMENTS ON HEAT AND MASS EXTRACTION FROM SOLAR PONDS Quarterly Report, 1 Apr. - 30 Jun. 1981
F. Zangrando Nov. 1981 27 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE82-006263; SERI/PR-252-1394; QR-1) Avail: NTIS HC A03/MF A01

The problem of heat and mass extraction from solar ponds is introduced, and a schedule for laboratory analysis of the topic is proposed. A literature review and preliminary conclusions based on existing analytical, numerical, and experimental work published on heat and mass extraction from partially stratified fluids, or related problems are presented. Work in the following areas is reviewed: selective withdrawal from stratified fluids; jets and plumes in stratified fluids and surface jets; flow recirculation in enclosed water bodies; stability of the interface between layers of different density; and energy exchange from buoyant jets.
Author

N82-29750# Michigan State Univ., East Lansing. Div. of Engineering Research.
OPERATIONS MODEL FOR UTILITIES USING WIND-GENERATOR ARRAYS
R. A. Schlueter, G. L. Park, J. Dorsey, M. Lotfalian, and A. Shayanfar 30 May 1981 40 p refs
(Contract DE-AC02-79ET-23168)
(DE82-005300; DOE/ET-23168/80/2) Avail: NTIS HC A03/MF A01

The effects that various combinations of wind regime, array configuration and penetrations, and system characteristics have on system variables such as area control error, frequency, interchange power and spinning reserve are discussed. The characteristics of the combinations causing system operating stress or operating problems are denoted and methods for estimating effects on a simplified and on a detailed simulation basis are reported. Methods for reducing operating problems are suggested and involve array configurations, penetration, unit commitment and dispatch changes, and wind generator controls. T.M.

N82-29751# California Univ., Livermore. Lawrence Livermore Lab.
LIVERMORE ENERGY POLICY MODEL AND PROJECTIONS OF ENERGY FUTURES FOR THE GAS RESEARCH INSTITUTE
R. Castleton Jun. 1981 38 p refs
(Contract W-7405-eng-48)
(DE82-006054; UCRL-53170) Avail: NTIS HC A03/MF A01

The Energy and Resource Planning Group at the Lawrence Livermore National Laboratory (LLNL) was asked by the Gas Research Institute to evaluate ten of their research projects relative to proposed funding levels for 1982. These energy technology projects included gas from unconventional and synthetic sources as well as utilization technologies. The primary tool used in the evaluation was the LLNL Policy Model (EPM). The report gives background information about the study, the basic assumptions used in the study, and some conclusions, and presents selected supporting results from the EPM runs. DOE

N82-29752# Colorado State Univ., Fort Collins. Solar Energy Applications Lab.
OPEN-CYCLE LITHIUM CHLORIDE (SOLAR) COOLING Final Report, 1 Feb. 1980 - 31 May 1981
G. O. G. Loef, S. Rao, and T. Lenz Dec. 1981 55 p refs
(Contract DE-AC03-79CS-30206)
(DE82-005665; DOE/CS-30206/T1) Avail: NTIS HC A04/MF A01

The characteristics of packed towers for use with open-cycle lithium chloride solar cooling are described, including types of packing, pressure drop, irrigated packings and allowable vapor velocity. The theory of packed column operation is outlined. Coefficients of heat transfer and mass transfer in a packed column in which water is vaporized from a LiCl solution by heated air were experimentally determined. The influences of air flow rate, humidity, and temperature on the coefficients of heat transfer and mass transfer in a packed column were also determined. Theoretical predictions of transfer coefficients and packed column sizes in an open cycle LiCl solar cooling system were verified. The feasibility of operating an open cycle cooling system was established. DOE

N82-29753# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SOLAR ENERGY CONTROLLED-ENVIRONMENT AGRICULTURE IN THE UNITED STATES AND IN SAUDI ARABIA
Werner Luft and Joseph Froechtenigt Nov. 1981 13 p refs
(Contract DE-AC02-77CH-00178)
(DE82-006140; SERI/TP-270-1465) Avail: NTIS

HC A02/MF A01

Greenhouse designs proposed for use in hot climates to reduce the temperature by essentially passive means are illustrated. The project plans of the SOLERAS, solar powered, controlled environment agriculture are outlined. The water desalination technology being evaluated is reverse osmosis. The solar collection technologies include flat plate thermal collectors, solar ponds, photovoltaics and wind turbines. DOE

N82-29754# Colorado State Univ., Fort Collins. Solar Energy Research Inst.

NOVEL CONCEPTS IN ELECTROCHEMICAL SOLAR CELLS Final Report

J. DuBow and Rajeshwar Krishnan Oct. 1981 193 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE82-003372; SERI/TR-9272-1-T2) Avail: NTIS HC A09/MF A01

Work is reported toward developing novel concepts for the achievement of stable and efficient photoelectrochemical (PEC) systems for terrestrial applications. Small band-gap semiconductors can be effectively stabilized in room temperature molten salts. The transport properties of these salts are found to be inferior to acetonitrile and water. On the other hand, fine-tuning of the semiconductor/electrolyte interface for specific PEC applications is much more readily accomplished with molten salts than with more conventional electrolytes. Photoelectrosynthetic reactions involving very positive potentials are reported easily carried out at the semiconductor/moltent salt interface. Specific ion adsorption or similar interactions of redox or electrolyte species with the semiconductor surface are found to lead to dramatic modification of the electrostatics at the interface, facilitating efficient electro-dynamic coupling at the interface under favorable circumstances. DOE

N82-29755# Sandia Labs., Livermore, Calif.

ANALYSIS OF BATTERY STORAGE IN WIND-ENERGY SYSTEMS FOR COMMERCIAL BUILDINGS

David L. Caskey, John Broehl (Battelle Columbus Lab.), and John Skelton (Battelle Columbus Lab.) 30 Sep. 1981 52 p refs
(Contract DE-AC04-76DP-00789)
(DE82-010875; SAND-81-7171) Avail: NTIS HC A04/MF A01

The performance of wind energy systems in commercial buildings was analyzed with and without storage to assess the economic value of storage. The SOLSTOR program used in the simulations is briefly described. Life-cycle energy cost and performance measures were calculated for different wind turbine and storage capacity levels. The analyses focused on Dodge City (average wind speed of 5.8 m/s) and Washington, DC (wind speed 2.9 m/s). Levelized system costs are computed for warehouse and office applications. To assess the sensitivity of the system performance measures and cost, two series of sensitivity tests were performed. The first determined the increase in system cost for an increase of storage capacity, and the second examined the effect of doubling the battery cost for the office building application. DOE

N82-29756# Delaware Univ., Newark. Inst. of Energy Conversion.

IMPROVED AMORPHOUS Si SOLAR CELLS Quarterly Progress Report, 1 Feb. - 30 Apr. 1981

Vikram L. Dalal Nov. 1981 37 p refs Sponsored in part by Solar Energy Research Inst.
(Contract DE-AC02-77CH-00178)
(DE82-006886; SERI/PR-9195-1-T3; QPR-5) Avail: NTIS HC A03/MF A01

Both n and p type a-Si:H films with very high conductivities were grown by diluting SiH4 in Ar or H2. These films have Fermi levels close to the conduction and valence bands (0.03 eV). The use of these heavily doped films as p( ) and n( ) junction layers in a p( ) in ( ) cell should increase the diffusion voltage of the diode, thereby increasing both J/sub sc/ and V/sub oc/. The conductivity and thermoelectric power on films of diverse thickness was analyzed and reveals no systematic changes. However, the drift mobility shows a systematic increase with thickness. The analysis of cells by quantum efficiency vs. applied voltage revealed the electron ((SIGMA) tau) product is limiting transport in nip cells and not the hole ((SIGMA) tau) product. A new device design, Tandem parallel connected cells, improves the current collection in a-Si cells. This design may help increase J/sub sc/ to 15 to 16 mA/cm(2) in a-Si:H. DOE

N82-29757# Oak Ridge National Lab., Tenn. Energy Div.

ENERGY USE FROM 1973 TO 1980: THE ROLE OF IMPROVED ENERGY EFFICIENCY

Eric Hirst, Richard W. Barnes, Steven M. Cohn, Kenton R. Corum, David L. Greene, David M. Hamblin, Gretchen Kulp, David B. Reister, and Teresa A. Vineyard Dec. 1981 57 p refs
(Contract W-7405-eng-26)
(DE82-010331; ORNL/CON-79) Avail: NTIS HC A04/MF A01

The post-embargo period is examined in terms of energy use in each of the major sectors: residential and commercial buildings, transportation, and industry. The analysis deals with two issues: what changes occurred in energy use during this period relative to pre-embargo trends, and why these changes occurred. Energy use in 1980 (76 Quads) was substantially lower than pre-embargo trends would suggest (by roughly 20 Quads). About half of this 20 Quad reduction was due to slower growth in economic activity. The remainder was due to improvements in energy efficiency, spurred primarily by rising fuel prices and also by government and utility conservation programs. The 1980 increase in overall energy efficiency (ten Quads) was due primarily to technical efficiency improvements (60%) and secondarily to operational changes (40%). DOE

N82-29758# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

PHYSICAL, CHEMICAL, AND ELECTRICAL STUDIES OF MIS SOLAR CELLS

M. A. Green Dec. 1981 31 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE82-007041; SERI/TR-213-1402) Avail: NTIS HC A03/MF A01

The physical, chemical, and electrical properties of high performance, MIS based silicon solar cells are investigated. It is shown that high resolution electron microscopy (HREM) can image the ultrathin oxides in these devices. HREM studies indicated that the oxide was of uniform thickness with no evidence of large pinholes or metallic inclusions. There appeared to be little physical difference between these ultrathin oxides and the substantially thicker oxides used in microelectronics. The chemical composition of these ultrathin oxides was investigated using X-ray photoelectron spectroscopy (XPS) and Auger electron spectroscopy (AES). Initial work with both XPS and AES indicated the presence of silicon dioxide. MINP solar cells incorporating the MIS structure displayed creditable efficiencies and exceptionally high open circuit voltages. A theoretical consequence of these high voltages is a reduced temperature coefficient of efficiency. DOE

N82-29759# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

SOLAR POND-DRIVEN DISTILLATION AND POWER PRODUCTION SYSTEM

D. Johnson, C. M. Leboeuf, and D. Waddington Dec. 1981 24 p refs
(Contracts DE-AC02-77CH-00178;EG-77-C-01-4042)
(DE82-010998; SERI/TR-631-1248) Avail: NTIS HC A02/MF A01

A solar pond driven distillation and power production system is described. The storage layer of the solar pond serves as the holding tank for the concentrated brine effluent from the distillation process as well as the collector and storage medium for solar energy used to heat incoming salty river water. Steam from the distillation process expands through a turbine/generator combination to provide power for the water circulation and vacuum pumps of the system. Water from the surface mixed layer of the pond is used to condense the steam. The closely integrated distillation and power production system converts an incoming stream of brackish or saline water into an outlet stream of the required purity. Salt and power are also products of the system. A thermodynamic analysis of the energy and mass balances of the system was performed and a performance model of the system is developed. This model is used to compute the

requirements for desalting several saline tributaries of the Colorado River. DOE

N82-29760# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SMALL-WIND-TURBINE PRODUCTION EVALUATION AND COST ANALYSIS
V. W. Greaver, J. Thornton, J. F. Britt, H. L. Davey, D. A. McCarroll, and K. J. Wysocki Dec. 1981 207 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE82-010675; SERI/TR-09049-1-Vol-1) Avail: NTIS HC A10/MF A01

The development factory cost for the production of a 10 kilowatt wind energy conversion system was studied. Three production levels are evaluated, 1000 units per year, 10,000 units per year and 100,000 units per year. Wind turbine design analysis and production analysis are reported. DOE

N82-29761# Thermo Electron Corp., Waltham, Mass.
DOE ADVANCED THERMIONIC TECHNOLOGY PROGRAM Progress Report, Jul. - Aug. - Sep. 1981
1981 37 p refs
(Contract DE-AC02-76ET-112892)
(DE82-010482; TE-4258-158-82; COO-3056-48; PR-48) Avail: NTIS HC A03/MF A01

Improvement of thermionic performance to the level that thermionic performance to the level that thermionic topping of fossil fuel powerplants becomes technically possible and economically attractive was studied. The operation of a thermionic module in a powerplant during the mid 1980's is also studied. Reliable thermionic operation in a combustion environment is demonstrated. Significant accomplishments include: (1) continuing stable output from the combustion test of the one inch diameter hemispherical silicon carbide diode at an emitter temperature of 17300 K for a period of over 9800 hours; (2) measurement of a barrier index of 2.15 eV (two inch diameter torispherical silicon carbide diode); and (3) successful thermal cycle test of a CVD silicon carbide coating inside a sintered molybdenum tube. E.A.K.

N82-29762# Los Alamos Scientific Lab., N. Mex.
PASSIVE SOLAR RETROFIT STUDY FOR THE UNITED STATES NAVY
W. O. Wray, C. R. Miles, and C. E. Kosiewicz Nov. 1981 27 p refs
(Contract W-7405-eng-36)
(DE82-010975; LA-9071-MS) Avail: NTIS HC A03/MF A01

A passive solar retrofit study was conducted. The energy savings obtainable in concrete block buildings from several passive solar heating and conservation strategies were determined. Test cell data and computer simulation was employed to assess the merits of six retrofit options. The selected strategies were chosen on the basis of providing a series of options that will deliver increasing energy savings at the cost of correspondingly increased levels of commitment. DOE

N82-29763# Office of Energy Resources, Augusta, Maine.
COMPREHENSIVE ENERGY RESOURCES PLAN
1981 165 p
(DE82-901889; NP-2901889) Avail: NTIS HC A08/MF A01

Historical trends, current status, and projections of sources and uses of energy in Maine are presented. An overview of conservation opportunities and current programs in four broad categories; residential, commercial/institutional, industrial, and transportation is provided. Cogeneration and district heating are discussed. The potentials and limits for the development of each of Maine's major renewable energy resources and some of the current government programs relating to them are discussed. Some of the most significant factors and issues regarding use of nonrenewable energy resources in Maine are described. The potential for energy exchange with Canada is briefly discussed. DOE

N82-29764# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
IMPROVED BETA ALUMINA ELECTROLYTES FOR ADVANCED STORAGE BATTERIES Interim Report, Dec. 1981
L. C. DeJonghe Dec. 1981 87 p refs
(Contract W-7405-eng-48; EPRI Proj. 252-3)
(DE82-010989; EPRI-EM-2160) Avail: NTIS HC A05/MF A01

Investigations on the factors determining the mechanisms of electrochemical failure initiation and propagation of polycrystalline sodium beta and beta'' alumina are reported. The investigations led to the distinction between two modes of failure. Mode I failure involved a cathode plating of sodium into a pre-existing crack. Mode II degradation involved the internal plating of sodium into a pre-existing crack. Mode II degradation involved the internal precipitation of sodium. The Mode I initiation current density thresholds were determined using acoustic emission detection. Experiments below and above the melting point of sodium were carried out. The results are reported in the form of Weibull failure probability plots. Below the melting point of sodium, the average current density threshold for initiation of Mode I failure depended on temperature, with an activation energy of about 4 kcal/mol. At 3500 C, it was found that a significant grain size dependence existed, in which large grained material exhibited lower average critical current density thresholds for Mode I initiation than fine grained material. DOE

N82-29765# Fluor Engineers and Constructors, Inc., Irvine, Calif.
ECONOMIC EVALUATION OF THE COPRODUCTION OF METHANOL AND ELECTRICITY WITH TEXACO GASIFICATION-COMBINED-CYCLE SYSTEMS Final Report
R. E. Brown, R. C. Delaney, W. W. Hsu, R. H. Ravikumar, S. C. Smelser, and R. M. Stock Jan. 1982 229 p refs
(EPRI Proj. 239-2)
(DE82-901983; EPRI-AP-2212) Avail: NTIS HC A11/MF A01

Process and cost reduction options for the production of methanol fuel for peaking and intermediate load generating units are evaluated. Methanol is coproduced with electricity from medium Btu gas generated in an oxygen blown gasification combined cycle (GCC) plant firing Illinois No. 6 coal. The liquid phase methanol process is used in a once through configuration where the unconverted reactor effluent is used for gas turbine fuel. The cost of methanol was determined by first calculating the revenue requirements of GCC plant without methanol coproduction. The methanol coproduction case was then credited with those electricity revenues and the remaining revenues required (in excess of the electricity credit) then represented the revenue requirement for methanol coproduction. DOE

N82-29766# Thermacore, Inc., Lancaster, Pa.
COST-EFFECTIVE SOLAR COLLECTORS USING HEAT PIPES Final Technical Report, Jul. 1979 - Aug. 1981
Donald M. Ernst 1981 66 p
(Contract DE-AC04-77CS-04099)
(DE82-011239; DOE/CS-34099/4) Avail: NTIS HC A04/MF A01

Evacuated tubular solar collectors were selected as the only economical non-concentrating approach capable of efficient operation of chillers. The General Electric TC family of collectors was chosen because of their high level of performance and compatibility with heat pipe integration. Three heat pipe fluid-vessel combinations were identified and are continuing to be life tested at design and stagnation conditions for time periods exceeding 33,000 hours. Testing was carried out at the lower end of the environmental temperature range by freeze/thaw testing several types of water heat pipes. Two heat pipe collectors were tested using trimethylborate/1010 steel and copper/water heat pipes. Both collectors should improve performance as compared to the standard General Electric TC-100. A cost analysis showed that in volume production the heat pipes could be made for $1.50 each (1978 dollars) and would be cost effective for the performance achieved in collector testing. DOE

N82-29767# Teknologisk Inst., Tastrup (Denmark).
DURABILITY OF SOLAR COLLECTORS. EXPERIENCE OF SOLAR COLLECTORS EXPOSED TO NATURAL WEATHER CONDITIONS IN A CONTROLLED SIMULATED OPERATION DURING 3 YEARS ON TESTING STAND
T. Vest Hansen, Gunnar Madsen, and Erik Mikkelsen Jul. 1980 86 p In DANISH
(DE82-900723; NP-2900723) Avail: NTIS (US Sales Only)

HC A05/MF A01; DOE Depository Libraries

Durability of several types of solar collectors after 3 years exposure was tested on an experimental testing stand with solar simulators. The collectors' resistance to corrosion in normal weathering conditions (snow, wind, rain) was tested; untightness of seals, changes in plastic foils, and glass recrystallisation are discussed. Recommendations are given on how to minimize the corrosive effects and choose the most suitable types and materials certified for outdoor durable exposure for villa-size solar heating systems. DOE

N82-29768# Danmarks Tekniske Bibliotek, Lyngby (Denmark). Fysisk Lab.

BIOGAS OF MANURE AND SLUDGE

Finn Kraemer, Jesper Gundermann, Erik Kofoed, and Jette Nielsen Jan. 1981 128 p refs In DANISH

(DE82-900839; NP-2900839) Avail: NTIS (US Sales Only) HC A07/MF A01; DOE Depository Libraries

Biogas production from farmyard manures and sewage sludges is based on anaerobic processes (methane-bacteria) and aerobic processes (fermentative bacteria). Biogas product has high calorific value and a number of small, pilot-scale and full-scale municipal systems of biogas production is described inclusive technological solutions and cost-benefit analysis. Experience of electric power generators fueled by biogas is evaluated from the view point of competitiveness with other fuels. DOE

N82-29769# New Mexico Univ., Albuquerque. Bureau of Engineering Research.

NEW MEXICO SOLAR NETWORKS PROJECT Final Technical Report, 1 Jul. 1978 - 30 Jun. 1980

Raymond J. Bahm Sep. 1981 288 p refs

(DE82-901498; NP-2901498; EMD-2-67-2124) Avail: NTIS HC A13/MF A01

Ground based measurements of solar radiation availability for the State of New Mexico were collected and an archival computerized Data Base Management System was developed for storage of that data. The resulting data base contains over 3.5 million records of solar and meteorological data. The computer programs prepared for the data processing system are documented and 12 insolation maps of New Mexico are included. DOE

N82-29770# Odense Univ. (Denmark).

PROJECT ELECTROCHEMICAL ENERGY STORAGE SYSTEMS 1. JAN. 1980 - 31. DEC. 1980. REPORT FOR THE MINISTRY OF ENERGY, FEBRUARY 1981

John Jensen Feb. 1981 83 p refs In DANISH

(DE82-900845; NP-2900845) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

Fabrication and properties of solid electrolytes, fast ion conductors, characterization and performance of solid solution electrodes, and battery applications studies and battery assessment are studied. The electrochemical research investigates materials with improved ionic conductivity - lithium nitrides and iodides, zeolites, and sodium ion conductors. Crystalline electrolytes (of TiS2/Li3N type) are investigated. Efficient batteries for propulsion purposes were evaluated from the economic and energy conservation point of view. DOE

N82-29771# Office of Appropriate Technology, Sacramento, Calif. Community Assistance Group.

LOCAL ENERGY INITIATIVES: A SECOND LOOK. A SURVEY OF CITIES AND COUNTIES, CALIFORNIA, 1981

Tom Tomasi 1981 135 p refs Prepared in cooperation with California Energy Commission and Southwest Innovation Group, Inc.

(PB82-152976) Avail: NTIS HC A07/MF A01 CSCL 10A

The energy activities of local government throughout California were surveyed. Published are: a survey of cities and counties, California 1980. The report based on that survey is distributed to all the state's local governments. Local energy initiatives, are extension of the same project. GRA

N82-29772# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Satellite Power Systems.

ELECTRIC POWER FROM ORBIT: A CRITIQUE OF A SATELLITE POWER SYSTEM

Aug. 1981 360 p refs

(Grant NSF PRM-79-19687)

(PB82-161514; ISBN-0-309-03183-4) Avail: NTIS HC A16/MF A01 CSCL 10B

The concept of a satellite power system (SPS) is examined. SPS would consist of a number of hugh satellites moving in orbit, each over a fixed point on the Earth, collecting solar energy for conversion into a concentrated form for transmission to Earth day and night. Receiving antennas would collect it and convert it into electricity to be fed into the nation's power distribution network. DOE

N82-29773# National Bureau of Standards, Washington, D.C. National Engineering Lab.

DEVELOPMENT OF AN ENERGY TEST METHOD FOR A DEDICATED WATER-HEATING HEAT PUMP

C. Andrew Wan, Robert L. Palla, Jr., and James E. Harris Jan. 1982 54 p refs Sponsored in part by DOE and ORNL

(PB82-161449; NBSIR-81-2372) Avail: NTIS HC A04/MF A01 CSCL 13A

Test method for measuring the energy consumption of water heaters was modified to include a dedicated water heating heat pump, system equipped with a 50 gallon electric water heater tank. Laboratory tests results and which provided the basis for the test methods used are presented. Tests included determination of recovery efficiency, standby loss, and water heater jacket loss -- all under static or no draw conditions -- and a synamic test in which water is withdrawn according to a typical use schedule. Energy requirements predicted by the proposed procedure were in good agreement with measured energy consumption for the dynamic test. GRA

N82-29774# Clemson Univ., S.C. Agricultural Experiment Station.

RESEARCH AND DEMONSTRATION FACILITIES FOR ENERGY CONSERVATION AND SOLAR HEATING IN THE HOME Final Report

Jerry O. Newman (Rural Housing Research Unit), Luther C. Godbey (Rural Housing Research Unit), Martin A. Davis, Dan O. Ezell, and W. Harold Allen 15 Oct. 1981 98 p refs

(Contract ARC-77-160/SC-5725B)

(PB82-161431; ARC-77-160-SC-5725B) Avail: NTIS HC A05/MF A01 CSCL 13A

The design, testing and evaluation of two prototype solar holes are discussed. The first prototype is a greenhouse-residence designed with 6-in. wall cavities (to increase insulation thickness), a 381 sq. ft. solar collector used primarily for space heating, and a greenhouse that was utilized as a solar collector for growing vegetables. The house does feature a domestic hot water preheating system and an electrical resistance back-up heating system. The second prototype is an earth-insulated house designed primarily to study the physical features of the house in relation to the soil around it and the thermal interaction between the soil and the house environment. This house features a high temperature air collector that is used for domestic water heating. A special effort was made to have adequate daylight in the solar-earth house. A special study was conducted on the geometric configuration of the rock storage and the methods of admitting air to the rock storage. GRA

N82-30251*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ANALYSIS OF CAPACITIVE HEAT EXCHANGERS, PART 2

D. Schonfeld *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 126-144 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 10A

N82-30259*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ENERGY CONSUMPTION ANALYSIS FOR THE MARS DEEP SPACE STATION

N. V. Hayes *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 200-207 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 10B

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N82-29775# Oak Ridge National Lab., Tenn. Environmental Sciences Div.

ENVIRONMENTAL SCIENCE DIVISION Annual Progress Report, period ending 30 Sep. 1980

S. I. Auerbach Mar. 1981 234 p refs

(Contract W-7405-eng-26)

(ORNL-5700; Publ-1730) Avail: NTIS HC A11/MF A01

Fossil energy systems emphasized development of data for comparative technology assessments. Emphasis continued to shift toward large scale, longer term studies with planning and initiation of pond experiments for assessing effects and fate of synthetic oil spills. Greater efforts were expended in evaluating potential hazards of solid residues with efforts initiated to compare combustion and conversion ashes and to identify the potential role of microbial systems in mobilizing trace elements contained in the residues. The bioaccumulation of Tc under field and small pond conditions provided more realistic concentration factors for regulatory models. More information on the chemistry of Pu in natural waters, the dissolution characteristics of Pu contaminated soil, and the bioaccumulation of the transuranium elements was obtained. Laboratory studies made substantial progress in defining a simple geochemical model for predicting Tc-99 migration from breached repositories. Environmental impact assessments were prepared on specific energy projects regarding nuclear power plants, uranium mines and mills, geothermal power plants and process heat users, oil fired power plants ordered to burn coal, the fusion energy development program, and a large facility to process high level nuclear waste from defense plants. Guidance documents were prepared in consideration of environmental matters especially related to competitive procurement and large demonstration facilities. S.L.

N82-29776*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

IMAGE PROCESSING DEVELOPMENTS AND APPLICATIONS FOR WATER QUALITY MONITORING AND TROPHIC STATE DETERMINATION

Richard J. Blackwell 1 Mar. 1982 98 p refs

(Contract NAS7-100)

(NASA-CR-169139; JPL-Publ-82-4; NAS 1.26:169139) Avail: NTIS HC A05/MF A01 CSCL 13B

Remote sensing data analysis of water quality monitoring is evaluated. Data analysis and image processing techniques are applied to LANDSAT remote sensing data to produce an effective operational tool for lake water quality surveying and monitoring. Digital image processing and analysis techniques were designed, developed, tested, and applied to LANDSAT multispectral scanner (MSS) data and conventional surface acquired data. Utilization of these techniques facilitates the surveying and monitoring of large numbers of lakes in an operational manner. Supervised multispectral classification, when used in conjunction with surface acquired water quality indicators, is used to characterize water body trophic status. Unsupervised multispectral classification, when interpreted by lake scientists familiar with a specific water body, yields classifications of equal validity with supervised methods and in a more cost effective manner. Image data base technology is used to great advantage in characterizing other contributing effects to water quality. These effects include drainage basin configuration, terrain slope, soil, precipitation and land cover characteristics. S.L.

N82-29777*# Garrett Turbine Engine Co., Phoenix, Ariz.

COMPUTATIONS OF SOOT AND AND NO SUB X EMISSIONS FROM GAS TURBINE COMBUSTORS Final Report

S. K. Srivatsa May 1982 300 p refs

(Contract NAS3-22542)

(NASA-CR-167930; NAS 1.26:167930; Rept-21-4309) Avail: NTIS HC A13/MF A01 CSCL 13B

An analytical program was conducted to compute the soot and NOx emissions from a combustor and the radiation heat transfer to the combustor walls. The program involved the formulation of an emission and radiation model and the incorporation of this model into the Garrett 3-D Combustor Perfomance Computer Program. Computations were performed for the idle, cruise, and take-off conditions of a JT8D can combustor. The predicted soot and NOx emissions and the radiation heat transfer to the combustor walls agree reasonably well with the limited experimental data available. Author

N82-29778# Federal Aviation Administration, Washington, D.C. Air Quality Div.

FEDERAL AVIATION ADMINISTRATION: HIGH ALTITUDE POLLUTION PROGRAM, REPORT PREPARED IN ACCORDANCE WITH THE STRATOSPHERIC OZONE PROTECTION PROVISION, SECTION 153(G), OF THE CLEAN AIR ACT AMENDMENTS OF 1977 Biennial Report, Jan. 1980 - Dec. 1981

Dec. 1981 43 p refs

(AD-A114906; FAA-EE-82-09; AEE-300; BR-3) Avail: NTIS HC A03/MF A01 CSCL 13/2

The impact of high altitude aviation on stratospheric ozone is now believed to be a decrease in total columnar ozone for flights above 15 km (about 49,000 feet). The model calculations also show that the current subsonic fleet (and the fleet foreseeable to 1990) will result in a net ozone increase of about 1%, considering normal flight altitudes. Whatever the net change in total column ozone, increases or depletions will occur at different altitudes. These are expected to have subtle influences on atmospheric circulation, the effects of which are only beginning to be understood. As a formal program, the High Altitude Pollution Program will be terminated in 1982 with the issuance of a final report. The FAA will continue to maintain and update, as appropriate, its capability to make quantitative assessment of the environmental effects of cruise altitude emissions, and will monitor and assist, as possible, other research programs, both here and abroad. Author (GRA)

N82-29779# Argonne National Lab., Ill. Integrated Assessments and Policy Evaluation Group.

EFFECTS OF ATMOSPHERIC DEPOSITION OF ENERGY-RELATED POLLUTANTS ON WATER QUALITY: A REVIEW AND ASSESSMENT

Michael J. Davis May 1981 98 p refs

(Contract W-31-109-eng-38)

(DE82-007036; ANL/AA-26) Avail: NTIS HC A05/MF A01

The effects on surface-water quality of atmospheric pollutants that are generated during energy production are reviewed and evaluated. Atmospheric inputs from such sources to the aquatic environment may include trace elements, organic compounds, radionuclides, and acids. Combustion is the largest energy-related source of trace-element emissions to the atmosphere. Several simple models for lakes and streams are developed and are applied to assess the potential for adverse effects on surface-water quality of trace-element emissions from coal combustion. The charater of acid precipitation is reviewed, with emphasis on aquatic effects, and the nature of existing or potential effects on water quality, aquatic biota, and water supply is considered. Methods for identifying regions sensitive to acid inputs are reviewed. The observed impact of acid precipitation ranges from no effects to elimination of fish populations. Coal-fired power plants and various stages of the nuclear fuel cycle release radionuclides to the atmosphere. Radioactive releases to the atmosphere from these sources and the possible aquatic effects of such releases are examined. DOE

N82-29780# General Electric Co., Schenectady, N. Y. Energy Systems Programs Dept.

ELECTROSTATIC GRANULAR BED FILTER DEVELOPMENT PROGRAM Final Report

Nov. 1981 195 p refs Sponsored in part by New York State Energy Research and Development Authority

(Contract DE-AC21-79ET-15490)

(DE82-004487; DOE/ET-15490/18; FE-5490-18) Avail: NTIS HC A09/MF A01

The application of the electrostatically enhanced granular bed filter (EGB) in a pressurized fluidized bed (PFB) combined cycle power plant was explored. The EFB filter avoids filter front face plugging which was the limiting factor in the development of granular bed filters for this application. An analytical model which predicts the performance of an EGB was also developed. The

test data and the model were utilized to establish preferred geometries and operating parameters of the EGB filter system applied in a 663 MWe PFB power plant. The applicability of the EGB filter to utility scale PFB power plants is assessed. New power plants must also meet new Source Performance Standards (.03 lb/10(6) Btu) which necessitates removal of dust in the respirable size range which would otherwise be harmless to the gas turbine. The potential of the EGB for achieving NSPS ahead of the gas turbine is demonstrated, and the conceptual design and economics of this application are presented. DOE

N82-29781# California Univ., Livermore. Lawrence Livermore Lab.
COSO GEOTHERMAL ENVIRONMENTAL OVERVIEW STUDY ECOSYSTEM QUALITY
P. Leitner Sep. 1981 56 p refs
(Contract W-7405-eng-48)
(DE82-006930; UCRL-15427) Avail: NTIS HC A04/MF A01

The Coso Known Geothermal Resource Area is located just east of the Sierra Nevada, in the broad transition zone between the Mohave and Great Basin desert ecosystems. The prospect of large-scale geothermal energy development here in the near future has lead to concern for the protection of biological resources. The objectives are the identification of ecosystem issues, evaluation of the existing data base, and recommendations of additional studies needed to resolve key issues. High-priority issues include the need for site-specific data on the occurrence of plant and animal species of special concern, accurate and detailed information on the nature and extent of the geothermal resource, and implementation of a comprehensive plan for ecosystem protection. DOE

N82-29782# Oak Ridge National Lab., Tenn. Energy Div.
ENVIRONMENTAL ASSESSMENT OF SYNFUELS PROJECTS
C. R. Boston 1980 13 p Presented before the City Council of Oak Ridge, Tenn., Oak Ridge, Tenn., 30 Oct. 1980 Submitted for publication
(Contract W-7405-eng-26)
(DE82-002727; DOE/TIC-2002727) Avail: NTIS HC A02/MF A01

Environmental assessments of synfuels demonstration projects are discussed. The preparation of environmental impact statements for all six DOE demonstration plants is reviewed. The synfuels technologies include high-Btu gasification, medium-Btu gasification and liquefaction. DOE

N82-29783# California Univ., Los Angeles. Lab. of Biomedical and Environmental Sciences.
ENVIRONMENTAL EFFECTS OF SOLAR THERMAL POWER SYSTEMS: ECOLOGICAL OBSERVATIONS DURING CONTRUCTION OF THE BARSTOW 10 MWe PILOT STPS
F. B. Turner, ed. Oct. 1981 106 p refs
(Contracts DE-AM03-76SF-00012; DE-AC03-76SF-00012)
(DE82-005441; UCLA-12/1311) Avail: NTIS HC A06/MF A01

Meteorological variables and changes in the state of a limited array of indicator species or assemblages of species of plants and animals for environmental monitoring were compared. Observations include aerial photography of the site, saltation meter measurements of downwind from the site to measure fluxes of windbown sand, measurements of airborne particulates and atmospheric pollutants, and baseline temperature profiles made at two sites near the heliostat field to measure micrometeorological patterns. Annual plants both in off-field plots and in heliostat field, shrubs, birds, rodents, reptiles, and sensitive species listed as rare or endangered are observed. DOE

N82-29784# Rochester Univ., N. Y. Dept. of Chemistry.
STUDY OF WEAKLY BOUND COMPLEXES CONTAINING ATMOSPHERIC-POLLUTANT MOLECULES Progress Report, 1 Dec. 1980 - 1 Sep. 1981
John S. Muenter 1981 11 p
(Contract DE-AS02-77EV-04321)
(DE82-006305; DOE/EV-04321/T1; COO-4321A-1; PR-1) Avail: NTIS HC A02/MF A01

The ability of sulfur dioxide to form complexes with a wide variety of partner molecules, X, was investigated. Using supersonic molecular beam nozzle expansions, eighteen different SO2.X species were generated and characterized. Factors affecting SO2.X bond formation were identified. DOE

N82-29785# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
CHARACTERIZATION OF AMBIENT AIR POLLUTION FOR STOCHASTIC HEALTH MODELS
S. A. Batterman Aug. 1981 229 p refs
(Contract DE-AC02-78EV-04968)
(DE82-005462; DOE/EV-04968/5) Avail: NTIS HC A11/MF A01

An analysis is made of various measures of ambient air pollution useful in cross-sectional epidemiological investigations and rick assessments. The Chestnut Ridge area health effects investigation, which includes a cross-sectional study of respiratory symptoms in young childeren, is used as a case study. Four large coal-fired electric generating power plants are the dominant pollution sources in this area of western Pennsylvania. The air pollution data base includes four years of sulfur dioxide and five years of total suspended particulate concentrations at seventeen monitors. Some 70 different characterizations of pollution are constructed and tested. These include pollutant concentrations at various percentiles and averaging times, exceedence measures which show the amount of time a specified threshold concentration is exceeded, and several dosage measures which transform non-linear dose-response relationships onto pollutant concentrations. DOE

N82-29786# Acurex Corp., Mountain View, Calif. Energy and Enironmental Div.
KINETICS OF NO SUB x FORMATION DURING EARLY STAGES OF PULVERIZED-COAL COMBUSTION Quarterly Report, 1 Oct. - 31 Dec. 1981
E. K. Chu, J. M. Kennedy, W. V. Krill, and S. L. Pessagno 1981 18 p
(Contract DE-AC22-80PC-30295)
(DE82-010520; DOE/PC-30295/5; QR-5) Avail: NTIS HC A02/MF A01

Baseline testing with Utah coal was initiated with the stirred reactor experimental apparatus. The addition of natural gas to the coal injection jet was implemented to improve the reactor temperature profile. After some adjustments to the coal testing procedure, unique high temperature data relating NO emissions to residence time and equivalence ratio was obtained. The experimental reactor configuration and testing procedure were revised to improve data quality for kinetic model correlation. The gaseous emission data from the revised approach appeared to be in the right trend. The solid data, however, were not consistent with the gaseous emission data. Corrective action on the solid sampling technique is currently underway. DOE

N82-29787# Fish and Wildlife Service, Kearneysville, W. Va. Eastern Energy and Land Use Team.
RIPARIAN ECOSYSTEMS: THEIR ECOLOGY AND STATUS Final Report
M. M. Brinson, B. L. Swift, R. C. Plantico, and J. S. Barclay Aug. 1981 174 p refs
(PB82-140369; FWS/OBS-81/17) Avail: NTIS HC A08/MF A01 CSCL 13B

Information on the ecological values of riparian ecosystems is reviewed. The following topics are discussed: status of riparian ecosystems in the U.S.; ecological functions and properties of riparian ecosystems, (geomorphology, primary productivity, nutrient cycling, hydrology), importance of riparian ecosystems to fish and wildlife; and considerations in valuation of riparian ecosystems. The riparian ecosystem was developed to document the natural values and importance of riparian ecosystems for consideration in water resources planning and development.GRA

N82-29788# GCA Corp., Chapel Hill, N.C. Technology Div.
SURVEY OF CADMIUM EMISSION SOURCES Final Report
Sep. 1981 163 p refs
(Contract EPA/68-02-3168)
(PB82-142050; EPA-450/3-81-013) Avail: NTIS HC A08/MF A01 CSCL 13B

Technical data are presented to support decision making on

the need for listing cadmium under Section 108(a)(1), Section 112(b)(1)(A), or Section 111(b)(1)(A) as required by Section 122 of the Clean Air Act, as amended in 1977. Data are presented describing potential sources of cadmium emissions, control techniques used for cadmium emission control, estimated controlled and uncontrolled cadmium emissions, estimated ambient air quality, and compliance status. The results of special dispersion modeling are presented for incineration, interaction of smelters and for interaction of sources in the New York City - New Jersey area. GRA

N82-29789# Carnegie-Mellon Univ., Pittsburgh, Pa. Center for Energy and Environmental Studies.
MULTI-OBJECTIVE DECISION-MAKING FOR ENVIRONMENTAL REGULATIONS: AIR POLLUTANT EMISSION STANDARDS FOR COAL-FIRED BOILERS, EXECUTIVE SUMMARY
David R. Lincoln, Nirmala Damodaran, Brad W. Crozier, and Edward S. Rubin May 1981 18 p 2 Vol.
(Grant NSF PRA-79-13069)
(PB82-146184; NSF/PRA-81011) Avail: NTIS HC A02/MF A01 CSCL 13B

Alternative air emission standards for coal fired boilers within a multiobjective decision framework were examined. Interpollatant tradeoffs were considered in a examination of enviromental regulatory policy. A multi-objective framework linking an environmental assessment model with a quantitative human decision-making model for evaluating multimedia environmental impacts of coal fired boilers was developed. The assessment model employ computer simulation of alternate coal-to-electric and coal-to-steam boiler systems. Pollution control technologies are presented for utility systems and industrial boilers. An interactive computer decision model (DECMOD) was developed to assess total social costs. Interview used to obtain information are described. It is indicated that: (1) it is possible to quantitatively model preferences for emission standards for coal fired burners; and (2) preferences can be determined for a broad range of standards after obtaining responses to a relatively limited series of questions. GRA

N82-29790# Carnegie-Mellon Univ., Pittsburgh, Pa. Center for Energy and Environmental Studies.
MULTI-OBJECTIVE DECISION-MAKING FOR ENVIRONMENTAL REGULATIONS: AIR POLLUTANT EMISSION STANDARDS FOR COAL-FIRED BOILERS
David R. Lincoln, Nirmala Damodaran, Brad W. Crozier, and Edward S. Rubin May 1981 248 p refs 2 Vol.
(Grant NSF PRA-79-13069)
(PB82-146192; NSF/PRA-81012) Avail: NTIS HC A11/MF A01 CSCL 13B

A multiobjective framework which combines an environmental assessment model with a quantitative human decisionmaking model for evaluating multimedia environmental impacts of coal fired boilers is presented. Interactive computer models were developed to support the assessment. It is shown that it is possible to quantitatively model preferences for emission standards for coal fired burners. Preferences can be determined for a road range of standards after obtaining responses to a relatively limited series of questions. The research model, coal fired boiler systems, the multiobjective decision model, interview procedures, and preferred emission levels are described. An example of a site description document and the interview format for DECMOD are included in the appendices. GRA

N82-29791# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Marine Pollution Assessment.
ANALYSIS OF RESIDUAL CHLORINATED HYDROCARBONS AROMATIC HYDROCARBONS AND RELATED COMPOUNDS IN SELECTED SOURCES, SINKS, AND BIOTA OF THE NEW YORK BIGHT
William D. MacLeod, Jr., L. Scott Ramos, Andrew J. Friedman, Douglas G. Burrows, and Patty G. Prohaska May 1981 135 p refs
(PB82-161209; NOAA-TM-OMPA-6; NOAA-81121405) Avail: NTIS HC A07/MF A01 CSCL 07D

The condition of the ecosystem in the New York Bight and significant environmental problems in the future was determined. The project was to provide information and data upon which management and planning decisions could be based. The goals were to develop an extensive understanding of the ecosystem processes and to study pollutants and other man related stresses on the New York Bight. A single overall objective of NAF's role was derived, vis.: The levels of arenes and PCBs and related compounds in samples of the marine environment and biota from the New York Bight are determined. GRA

N82-29854# Joint Publications Research Service, Arlington, Va.
USE OF GAS CHROMATOGRAPHY TO ANALYZE THE ENVIRONMENT (1978-1980 LITERATURE SURVEY)
S. F. Yavorovskaya *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 17 (JPRS-81419) 2 Aug. 1982 p 22-31 refs Transl. into ENGLISH from Gig. Tr. Prof. Zabol. (USSR), no. 10, Oct. 1981 p 35-40 (For primary document see N82-29853 20-51)
Avail: NTIS HC A06/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N82-29792# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LATITUDINAL AND MAGNETIC FLUX TUBE EXTENSION OF THE EQUATORIAL SPREAD F IRREGULARITIES
M. A. Abdu, R. T. deMedeiros, and Y. Nakamura Mar. 1982 25 p refs Submitted for publication
(INPE-2343-PRE/087) Avail: NTIS HC A02/MF A01

The spread F occurrence characteristics at the magnetic equatorial station, Fortaleza (4 S, 38 W, dip latitude 1.8 S) and the low latitude station, Cachoeira Paulista (22 S, 45 W, dip latitude 14 S) located with a relatively small longitudinal difference, in Brazil are compared. The results show strong correlation between the occurrences of spread F events at the two stations for most of the time. While all the spread F events over Cachoeira Paulista are accompanied by such events over Fortaleza, the converse is not true. Also the spread F onset times over the equator are systematically earlier than over the low latitude. Although the spread F durations at the two stations are approximately linearly related, an event over Cachoeira Paulista is observed only for those that have durations more than 4 to 5 hours over Fortaleza. Possible implications of these results on the plasma bubble rise velocities in the equatorial ionosphere are discussed. S.L.

N82-29793*# Science Systems and Applications, Inc., Seabrook, Md.
OZONE UNCERTAINTIES STUDY ALGORITHM (OUSA) Final Technical Report
Om P. Bahethi [1982] 24 p refs
(Contract NAS5-26083)
(NASA-CR-166818; NAS 1.26:166818) Avail: NTIS HC A02/MF A01 CSCL 04A

An algorithm to carry out sensitivities, uncertainties and overall imprecision studies to a set of input parameters for a one dimensional steady ozone photochemistry model is described. This algorithm can be used to evaluate steady state perturbations due to point source or distributed ejection of H2O, CLX, and NOx, besides, varying the incident solar flux. This algorithm is operational on IBM OS/360-91 computer at NASA/Goddard Space Flight Center's Science and Applications Computer Center (SACC). Author

N82-29794*# Old Dominion Univ., Norfolk, Va.
MEASUREMENTS OF THE GLOBAL DISTRIBUTION OF CARBON MONOXIDE IN THE TROPOSPHERE
Rebecca R. Hinton Jul. 1982 44 p refs
(Contract NCC1-2)
(NASA-CR-169161; NAS 1.26:169161) Avail: NTIS HC A03/MF A01 CSCL 04A

Carbon monoxide and methane grab samples were obtained

simultaneously with ozone, aerosol, nitric oxide and DACOM CO measurements. Eighty grab samples were collected at various altitudes up to 19,000 ft. along a north-south flight path from Wallops Flight Center, VA to 11 N. CO and CH were analyzed by flame ionization gas chromatography with cryogenic preconcentration. The relationship between CO and O3 concentrated is examined. A comparative analysis between trends in aerosol and CO concentration is performed. Author

N82-29795# Office de la Recherche Scientifique et Technique, Bondy (France).
SEISMOLOGICAL INVESTIGATION OF THE BANGUI ANOMALY AND ITS RELATION TO THE MARGIN OF THE CONGO CRATON Progress Report
R. Godivier, ed., Catherine Borbath, Louis Borbath, and Roland Gaulon (CNRS) 20 Jul. 1982 40 p refs
(M-45) Avail: NTIS HC A03/MF A01

The inversion of teleseismic arrival times of P waves recorded by a temporary linear array of seismological stations in Central African Republic shows that structural variations persist down to a depth of 160 km at least. Crustal thickness is about 40 km. Lateral inhomogeneities may be related to the northern margin of the Congo craton where up to 4% higher velocities are observed. Similar patterns of the Bangui magnetic anomaly, one of the largest features occurring over a stable continent, and of the seismic velocity distribution indicate a close relation. The abnormal magnetic field would be due to deep structure with higher susceptibility. Author

N82-29796*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPLYING MODELING RESULTS IN DESIGNING A GLOBAL TROPOSPHERIC EXPERIMENT
Jul. 1982 95 p refs Presented at a Working Group Meeting, Virginia Beach, Va., 15-16 Jul. 1981
(NASA-CP-2235; L-15383; NAS 1.55:2235) Avail: NTIS HC A05/MF A01 CSCL 04A

A set of field experiments and advanced modeling studies which provide a strategy for a program of global tropospheric experiments was identified. An expanded effort to develop space applications for trospheric air quality monitoring and studies was recommended. The tropospheric ozone, carbon, nitrogen, and sulfur cycles are addressed. Stratospheric-tropospheric exchange is discussed. Fast photochemical processes in the free troposphere are considered. N.W.

N82-29797*# Illinois Univ., Urbana. Aeronomy Lab.
THE TRANSPORT OF NITRIC OXIDE IN THE UPPER ATMOSPHERE BY PLANETARY WAVES AND THE ZONAL MEAN CIRCULATION
G. A. Jones and S. K. Avery 1 Jun. 1982 268 p refs
(Grants NsG-7507; NGR-14-005-181; NSF ATM-76-01773; NSF ATM-79-09982; NSF ATM-81-17440)
(NASA-CR-169214; NAS 1.26:169214; UILU-ENG-82-2503; UILU-Aeronomy-103; ISSN-0568-0581) Avail: NTIS HC A12/MF A01 CSCL 04A

A time-dependent numerical model was developed and used to study the interaction between planetary waves, the zonal mean circulation, and the trace constituent nitric oxide in the region between 55 km and 120 km. The factors which contribute to the structure of the nitric oxide distribution were examined, and the sensitivity of the distribution to changes in planetary wave amplitude was investigated. Wave-induced changes in the mean nitric oxide concentration were examined as a possible mechanism for the observed winter anomaly. Results indicate that vertically-propagating planetary waves induce a wave-like structure in the nitric oxide distribution and that at certain levels, transports of nitric oxide by planetary waves could significantly affect the mean nitric oxide distribution. The magnitude and direction of these transports at a given level was found to depend not only on the amplitude of the planetary wave, but also on the loss rate of nitric oxide at that level. A.R.H.

N82-29798*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EQUATORIAL OZONE CHARACTERISTICS AS MEASURED AT NATAL (5.9 DEG S, 35.2 DEG W)
Volker W. J. H. Kirchhoff, E. Hilsenrath, A. G. Motta, Y. Sahai, and R. A. Medrano-B Apr. 1982 30 p refs Prepared in cooperation with Instituto de Pesquisas Espaciais Submitted for publication
(NASA-TM-84716; NAS 1.15:84716; INPE-2365-PRE/098) Avail: NTIS HC A03/MF A01 CSCL 04A

Ozone density profiles obtained through electrochemical concentration cell (ECC) sonde measurements at Natal were analyzed. Time variations, as expected, are small. Outstanding features of the data are tropospheric densities substantially higher than those measured at other stations, and also a total ozone content that is higher than the averages given by satellite measurements. Author

N82-29799# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
VERTICAL IONIZATION DRIFT VELOCITIES AND RANGE TYPE SPREAD F IN THE EVENING EQUATORIAL IONOSPHERE
M. A. Abdu, R. T. deMedeiros, J. A. Bittencourt, and I. S. Batista Feb. 1982 14 p refs Submitted for publication
(INPE-2332-PRE/081) Avail: NTIS HC A02/MF A01

Range type spread F indices in the post sunset hours, determined from ionograms, are compared with F layer vertical vellcities, also deduced from ionograms, for a period of one year, over the magnetic equatorial station Fortaleza (geographic coordinates: 4 S, 38 W; dip latitude: 1.8 S), Brazil. Besides good correlation between the two parameters, the results suggest the presence of a certain threshold value for the vertical ionization velocity and a corresponding threshold height for the base of the evening F layer, as one of the necessary conditions for the occurrence of spread F irregularities. The nature of the possible variabilities in the amplitude of the initial perturbation in the ionization, which is another prerequisite for the generation of irregularities, is discussed briefly. Author

N82-29800# Electro Magnetic Applications, Inc., Denver, Colo.
ATMOSPHERIC ELECTRICITY HAZARDS ANALYTICAL MODEL DEVELOPMENT AND APPLICATION. VOLUME 1: LIGHTNING ENVIRONMENT MODELING Final Report, Aug. 1979 - Jun. 1982
Martin A. Uman (Lightning Location and Protection, Inc.) and E. Philip Krider (Lightning Location and Protection, Inc.) Wright-Patterson AFB, Ohio AFWAL Aug. 1981 172 p refs 3 Vol.
(Contract F33615-79-C-3412; AF Proj. 2402)
(AD-A114015; EMA-81-R-21-Vol-1; AFWAL-TR-81-3084-Vol-1) Avail: NTIS HC A08/MF A01 CSCL 04/1

The state of the art of lightning phenomenology and its electromagnetic environment is reviewed. All aspects and phases are discussed. A model is chosen for each phase which best describes what is currently known and understood. Computer models for predicting the electromagnetic environment for several of the processes are given, along with numerical predictions. A comprehensive bibliography is also provided. Author

N82-29801# Lightning and Transients Research Inst., Melbourne, Fla.
ATMOSPHERIC ELECTRICITY HAZARDS ANALYTICAL MODEL DEVELOPMENT AND APPLICATION. VOLUME 2: SIMULATION OF THE LIGHTNING/AIRCRAFT INTERACTION EVENT Final Report, Aug. 1979 - Jun. 1981
John D. Robb Wright-Patterson AFB, Ohio AFWAL Jun. 1981 59 p refs 3 Vol.
(Contract F33615-79-C-3412; AF Proj. 2402)
(AD-A114016; EMA-81-R-21-Vol-2; AFWAL-TR-81-3084-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 04/1

A review of currently used lightning test techniques for aircraft is given. The requirements for lightning simulation are given and discussed. Finally, a new approch for simulating the lightning/aircraft interaction is presented, and is based on nuclear electromagnetic pulse (NEMP) technology. GRA

N82-29802# Electro Magnetic Applications, Inc., Denver, Colo.
ATMOSPHERIC ELECTRICITY HAZARDS ANALYTICAL MODEL DEVELOPMENT AND APPLICATION. VOLUME 3: ELECTROMAGNETIC COUPLING MODELING OF THE LIGHTNING/AIRCRAFT INTERACTION EVENT Final Report,

Aug. 1979 - Jun. 1981
F. J. Eriksen, T. H. Rudolph, and Rodney Perala Wright-Patterson AFB, Ohio AFWAL Jun. 1981 330 p refs 3 Vol.
(Contract F33615-79-C-3412; AF Proj. 2402)
(AD-A114017; EMA-81-R-21-Vol-3;
AFWAL-TR-81-3084-Vol-3) Avail: NTIS HC A15/MF A01 CSCL 04/1

The state of the art of coupling of electromagnetic fields to aircraft is reviewed. Assessing the electromagnetic interaction of lightning with aircraft is considered. The coupling process is explained and the modeling requirements implied by the lightning environment are discussed. The description of models selected and implemented is given. Author

N82-29803# Princeton Univ., N. J. Dept. of Chemical Engineering.
CHEMICAL REACTIONS AND MOLECULAR AGGREGATION IN CRYOGENIC WHOLE AIR SAMPLE MATRICES Final Report, 1 Mar. 1980 - 30 Sep. 1981
J. M. Calo, R. J. Fezza, and G. F. Ryan Jan. 1982 110 p refs
(Contract F19628-80-C-0066; AF Proj. 6687)
(AD-A114661; AFGL-TR-82-0061) Avail: NTIS HC A06/MF A01 CSCL 04/1

Chemical reactions and molecular aggregation phenomena in cryogenic condensates associated with in-situ cryogenic whole air sampling of stratospheric species are examined. Results for two types of studies are reported. In the first type, the gas phase composition resulting from thermal desorption of pure and mixed condensates collected on the cold end of a mechanical, helium-cycle, cryogenic refrigerator is determined with mass spectrometry and NOx chemiluminescence (when possible). This technique was applied to studies of the reactions of nitric oxide and ozone upon thermal desorption. The most salient results were:(1) disproportionation of nitric oxide to nitrogen dioxide and nitrogen during desorption of pure nitric oxide condensate at levels exceeding 50%; (2) significant recombination of ozone upon flash desorption; and (3) oxidation of nitric oxide to nitrogen dioxide by zone upon desorption of nitric oxide/ozone condensates. The second technique involves the direct observation of species behavior in the cryogenic condensate upon warming with infrared spectrophotometry. GRA

N82-29804# Defense Advanced Research Projects Agency, Arlington, Va.
A TECHNICAL ASSESSMENT OF SEISMIC YIELD ESTIMATION. APPENDIX, PART 1
Jan. 1981 304 p refs
(AD-A114653; DARPA-NMR-81-01-App-Pt-1) Avail: NTIS HC A14/MF A01 CSCL 08/11

The DARPA report, 'A Technical Assessment of Seismic Yield Estimation,' is a review of the state of current understanding of important technical issues relating to the seismic estimation of the yield of underground nuclear explosions. In preparing this review, contributions were solicited from selected government, university, and industry scientists who responded with summaries of their assessment of the state of knowledge in those areas with which they were most familiar. These contributions are collected in this Appendix. GRA

N82-29805# Defense Advanced Research Projects Agency, Arlington, Va.
A TECHNICAL ASSESSMENT OF SEISMIC YIELD ESTIMATION. APPENDIX, PART 2
Jan. 1981 198 p refs
(AD-A114654; DARPA-NMR-81-01-App-Pt-2) Avail: NTIS HC A09/MF A01 CSCL 08/11

In the context of nuclear explosion seismology, surface wave magnitudes, MS, derived from measurements of Love or Rayleigh waves, have assumed particular importance since they are utilized in two areas, namely: Discrimination - where the discrimination between explosions and earthquakes relies heavily on the contrast in surface wave generation by the two event types. This contrast is normally measured by MS vs body wave magnitude, mb, criteria. Determination of explosion yield using MS. In this paper, the background of surface wave magnitude determination is outlined, followed by discussions of present practice in surface wave measurements at both teleseismic and regional distances. A final section outlines recommended studies related to improving determination of surface wave magnitudes and other, more sophisticated, methods of evaluating long period energy content in the seismic surface wave train. GRA

N82-29806# Ertec Western, Inc., Long Beach, Calif.
VERIFICATION STUDY. PAHROC VALLEY, NEVADA. VOLUME 2: GEOTECHNICAL DATA Final Report
30 Jun. 1981 119 p
(Contract F04704-80-C-0006; AF Proj. 6431)
(AD-A113223; E-TR-27-PA-2) Avail: NTIS HC A06/MF A01 CSCL 08/13

An activity map and geographical coordinates are provided. Geologic station, ground water, seismic refraction, and electrical resistivity data are presented. Boring, trench, and test pit, and surficial soil sample logs are included. Laboratory and cone penetrometer test results are provided. N.W.

N82-29807# Columbia Univ., Palisades, N.Y. Geological Observatory.
COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE EASTERN ALEUTIAN ARC AND ASSOCIATED VOLCANIC SYSTEMS Annual Progress Report, 1 Mar. 1981 - 28 Feb. 1982
K. H. Jacob, E. Hauksson, L. R. Sykes, J. Davies, L. House, J. Morl, S. McNutt, D. Johnson, J. Peterson, J. Hauptman et al 1981 82 p refs
(Contract DE-AS02-76ER-03134)
(DE82-005473; DOE/ER-03134/T1) Avail: NTIS HC A05/MF A01

Assessment of the seismic potential for occurrence of great earthquakes in three seismic gaps (Shumagin Islands, Unalaska Island, and Yakataga-Kayak regions) was completed. In the best instrumented seismic gap in the Shumagin Islands region, the likelihood for a great earthquake within the next two decades is high. Analysis of earthquake data collected from a telemetered network operated in the Shumagin seismic gap shows near quiescence in the shallow portion of the main thrust zone. High time resolution data (0.01 sec), and wider frequency bandpass data (0.5 to 30 Hz) are being collected. Seismic data for two eruptive sequences of Pavlof volcano were obtained. DOE

N82-29808# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
MILLIMETER AND SUBMILLIMETER WAVE ABSORPTION BY ATMOSPHERIC POLLUTANTS AND CONSTITUENTS
W. F. Kolbe and B. Leskovar Oct. 1981 13 p refs
(Contract W-7405-eng-48)
(DE82-005142; LBL-12236) Avail: NTIS HC A02/MF A01

Calculated absorption coefficients and rotational transition frequencies are given for a number of polar molecules of interest to pollution and energy research. The results, which are presented in graphical form for microwave frequencies up to 1400 GHz, illustrate the increased absorption line intensities occurring in the submillimeter region. For most species these absorption coefficients attain their maximum values in this region. Included in the calculations are the gases SO2, H2CO, O3, H2O, H2S, OCS, CO, NO, OH, SO, NH3, and CS. A discussion of the techniques currently available for the detection in the submillimeter region of these species is also given. DOE

N82-29809# Denver Univ., Colo. Dept. of Mathematics and Computer Science.
INVERSE METHOD FOR SEISMIC PROFILING AND REFLEC[illegible] IMAGING Final Report
Norman Bleistein, Jack K. Cohen, and Frank C. Hagin 2 Dec. 1981 13 p
(Contract DE-AC02-80[illegible] 10769)
(DE82-004875; DOE/ER-10769/4) Avail: NTIS HC A02/MF A01

Application of inverse methods to seismic exploration and nondestructive testing was investigated. Working computer codes were developed implementing theories in three dimensions. These codes are successfully implemented on real data sets and are identified as the only inversion codes which work in more than one dimension. There are also higher order accurate one dimensional computer codes. Progress is made in extending the higher order accurate theory to three dimensions and also in

developing a new theory which accounts for refraction effects and transmission losses more accurately than do existing theories and algorithms. DOE

N82-29810# California Univ., Livermore. Lawrence Livermore Lab.
CORRELATION BETWEEN ROCK STRENGTH AND ACOUSTIC VELOCITY
Robert N. Schock 4 Nov. 1981 14 p refs Presented at the Monterey Conf. Symp., Los Alamos, N. Mex., 9 Nov. 1981
(Contract W-7405-eng-48)
(DE82-006786; UCRL-86867) Avail: NTIS HC A02/MF A01

Laboratory measured strength and ultrasonic velocity data on a wide variety of rocks were examined for possible correlation between velocity and shear strength. The rocks cover a wide range of densities, strengths, porosities, and water saturations. Thirty six different data sets yield a correlation between strength and velocity. The fit is a power law and is best when the velocity data are converted to a modulus. Shear wave velocity data provide a much better fit than compressional wave velocity data. It is indicated that estimates of strength can be within a factor of 5 using shear wave velocity, and within an order of magnitude using compressional wave velocity data. However, if the rock type is known, an estimate of strength can be made to within a factor of 2, if the shear wave velocity is known. DOE

N82-29811# Texas A&M Univ., College Station. Center for Tectonophysics.
MECHANICAL AND TRANSPORT PROPERTIES OF ROCKS AT HIGH TEMPERATURES AND PRESSURES. TASK 1: THE PHYSICAL NATURE OF FRACTURING AT DEPTH Technical Progress Report, 1 Mar. - 30 Oct. 1981
N. L. Carter 15 Nov. 1981 44 p refs
(Contract DE-AS05-79ER-10361)
(DE82-004618; DOE/ER-10361/2A; TPR-2) Avail: NTIS HC A03/MF A01

Static fatigue tests at low pressure and moderate temperature mainly on granitic rocks including quartzite and diorite are reported. Transient and steady state experiments at high pressure and temperature are also investigated. DOE

N82-29812# Texas A&M Univ., College Station. Center for Tectonophysics.
MECHANICAL AND TRANSPORT PROPERTIES OF ROCKS AT HIGH TEMPERATURES AND PRESSURES. TASK 2: FRACTURE PERMEABILITY OF CRYSTALLINE ROCKS AS A FUNCTION OF TEMPERATURE, PRESSURE, AND HYDROTHERMAL ALTERATION
1981 27 p refs
(Contract DE-AS05-79ER-10361)
(DE82-004617; DOE/ER-10361/2B) Avail: NTIS HC A03/MF A01

The variation of the fracture permeability of quartzite subjected to hydrothermal conditions was measured. Pore fluids consist of distilled water and aqueous Na2CO3 solutions at temperatures to 2500 C, fluid pressures to 20 MPa and effective normal stresses to 70 MPa. Fluid flow rates are controllable to rates at least as small as 0.2 m1/day (approx. 4 fracture volumes). The role of pressure solution at time scales of those of the experiments (less than or equal to 2 weeks) are assessed. Objectives are to: (1) continue simulated fracture studies, incorporating inelastic deformation into models and characterize the nature of inelastic deformation occurring on loaded tensile fractures in quartzite; (2) continue dissolution experiment, emphasizing dissolution modification of tensile fracture surfaces on quartzite; and (3) study natural fractures in a quartzite exhibiting hydrothermal dissolution features. DOE

N82-29813# Texas A&M Univ., College Station. Center for Tectonophysics.
MECHANICAL AND TRANSPORT PROPERTIES OF ROCKS AT HIGH TEMPERATURES AND PRESSURES. TASK 3: MECHANICAL PROPERTIES OF ROCKS AT HIGH TEMPERATURES AND PRESSURES Technical Progress Report, 1 Mar. - 1 Nov. 1981
M. Friedman, J. Handin, and S. J. Bauer 15 Nov. 1981 93 p refs
(Contract DE-AS05-79ER-10361)
(DE82-004616; DOE/ER-10361/2C; TPR-2) Avail: NTIS HC A05/MF A01

The mechanical properties of rocks of high temperatures and pressure were studied. The objectives are: (1) to determine in static triaxial experiments the short term strengths and ductilities of room dry and water saturated specimens of selected rocks at effective confining pressures to 150 MPa, temperatures to 10000C or partial melting, and strain rates of 10(+4) to 10(+7)s(+1); and (2) to extrapolate these data to the assessment of rock drillability and of borehole stability in the geothermal regime above buried magma chambers. The thermal expansion of the same rocks to temperatures of 8000C, and the static fatigue of a granite, again to 8000C was also studied. DOE

N82-29814# Los Alamos Scientific Lab., N. Mex.
SYNTHESIS OF HYDROCARBONS IN THE EARTH'S CRUST
N. E. Vanderborgh Nov. 1981 6 p refs
(Contract W-7405-eng-36)
(DE82-007356; LA-8983) Avail: NTIS HC A02/MF A01

An alternative theory for the generation and migration of petroleums is suggested. Considerable evidence supports the conclusion that life processes persist deep within terrestrial and marine environments. Such in vivo processes may survive in photon-free ecologies using mechanisms that both reduce carbon dioxide and oxidize sulfides. These in vivo conversions create petroleums. Author

N82-29815# California Univ., Livermore. Lawrence Livermore Lab.
SEISMOLOGICAL INVESTIGATIONS IN THE LIVERMORE VALLEY REGION, CALIFORNIA. PART 1: GEOLOGIC SETTING AND P-VELOCITY MODELS
S. R. Taylor and J. F. Scheimer Jun. 1981 46 p refs
(Contract W-7405-eng-48)
(DE82-005847; UCRL-53169-Pt-1) Avail: NTIS HC A03/MF A01

P-wave travel times from 223 well-recorded earthquakes and five times explosions recorded by the USGS-LLNL seismic network are inverted simultaneously for one- and three-dimensional velocity structure and hypocenter loctions. Initial one-dimensional velocity inversions indicate a fairly strong positive velocity gradient in the upper crust to depths of about 6 km. Calculated station delays show a good correlation with geologic structure. Arrivals at stations within the Livermore Valley are delayed by about 0.4 sec relative to those located to the south in the Diablo Range where relatively high velocity rocks of the Franciscan Formation are exposed. The Franciscan basement appears to occur at a depth of about 5 to 8 km beneath the valley. Three-dimensional models show that the strongest velocity contrasts occur along the eastern and southern edges of the valley where lower velocity down-dropped Tertiary sediments and basin-fill alluvium are found in structural contact with higher velocity Late Mesozoic and Tertiary sediments of the Altamont anticline and the Diablo Range. Author

N82-29816# SRI International Corp., Menlo Park, Calif.
EXPERIMENTAL AND THEORETICAL STUDY OF HYDRAULIC FRACTURING IN IMPERMEABLE AND PERMEABLE MATERIALS Final Report
M. B. Rubin Oct. 1981 175 p refs
(Contract DE-AC21-79MC-11597; SRI Proj. PYU-8974)
(DE82-004902; DOE/MC-11597/T1) Avail: NTIS HC A08/MF A01

Hydraulic fracture propagation in impermeable and permeable materials was studied. The complicating effects of fluid leak-off and proppant transport were separated by conducting experiments on an impermeable material without proppants, on a permeable material without proppants, and, finally, on the same permeable material with proppants. Borehole pressure, pressure in the fracture, fracture width, and fracture length were measured in both impermeable and permeable experiments. In addition, the extent of fluid penetration into the permeable material was measured in the permeable experiments. It was observed that both the borehole pressure and the pressure gradient in the fracture were considerably larger in the experiments with proppants than in the experiments without proppants. The results of the impermeable and permeable experiments were compared

with the corresponding predictions of a solution developed here as well as those of other simple formulas for hydraulic fracture propagation. Although the predictions of the present solution are an improvement over those of the other simple solutions, future research is needed to reduce the discrepancy between theory and experiment. This discrepancy is attributed to the effect of fluid penetration on the fracture mechanics of the permeable medium. DOE

N82-29817# Swedish Meteorological and Hydrological Inst., Norkoeping.
SOLAR RADIATION DATA SOURCE CATALOGUE
Weine Josefsson and Marie Louise Westerburg Oct. 1980 158 p refs
(PB82-137803; ISBN-91-540-3581-3) Avail: NTIS HC A08/MF A01 CSCL 04A

Radiation data and relevant meteorological data are provided. Important concepts of radiation are introduced together with a brief presentation of radiation quantities and radiation instruments. Information needed for an optimal use and understanding of the data is given. A compilation of radiation data sources and radiation stations is included. GRA

N82-29818# National Oceanic and Atmospheric Administration, Washington, D. C.
TRANSMITTANCES FOR THE TIROS OPERATIONAL VERTICAL SOUNDER
M. P. Weinreb, H. E. Fleming, L. M. McMillin, and A. C. Neuendorffer Sep. 1981 68 p refs
(PB82-155920; NOAA-TR-NESS-85; NOAA-81103009) Avail: NTIS HC A04/MF A01 CSCL 04A

Atmospheric transmittances are calculated for temperature soundings with the TIROS Operational Vertical Sounder (TOVS). The role of transmittances in both integrating and solving the radiative transfer equation is discussed. Transmittances are generated for vertical and slant paths. They represent convolutions with the spectral response functions of the infrared and the microwave channels of the TOVS. For spectral lines of the uniformly-mixed gases and of water vapor, efficient approximations are used. The water-vapor continua and molecular nitrogen's 4.3-micron m band are integrated directly through the atmosphere. A simple interpolation scheme suffices for the weak absorption by ozone. Author

N82-29819# National Academy of Sciences - National Research Council, Washington, D. C. World Data Center A for Glaciology.
GLACIOLOGY IN CHINA
Ann M. Brennan, ed. May 1981 75 p
(PB82-148180; GD-10; NOAA-81180504) Avail: NTIS HC A04/MF A01 CSCL 08L

Areas of Chinese activity in glaciology, and sources of information still relevant are identified. A bibliography of publications on glaciological studies in China and Tibet is presented. GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N82-29820 Deutscher Wetterdienst, Offenbach am Main (West Germany).
ANNALS OF METEOROLOGY NO. 17. CELEBRATION SYMPOSIUM: 200 YEARS OF METEOROLOGICAL OBSERVATIONS ON HOHENPEISSENBERG
Max Schlegel, ed. 1981 23 p refs In GERMAN Conf. held at Polling bei Weilheim/Obb., West Germany, 8 May 1981
(ISSN-0072-4122; ISBN-3-88148-190-7) Copyright. Avail: Issuing Activity

The history of Hohenpeissenberg Meteorological Observatory was discussed. The significance of areal radar rainfall measurements for hydrology, and the ozone layer of the atmosphere are included. For individual titles, see N82-29821 through N82-29823.

N82-29821 Meteorologisches Observatorium, Hohenpeissenberg (West Germany).
HISTORY OF METEOROLOGICAL OBSERVATION AND OF THE HOHENPEISSENBERG METEOROLOGICAL OBSERVATORY [GESHICHTE DER METEOROLOGISCHEN BEOBACHTUNGEN UND DES METEIOROLOGISCHEN OBSERVATORIUMS HOHENPEISSENBERG]
Walter Attmann. Bacher *In* Deut. Wetterdienst Ann. of Meteorol. No. 17. Celebration Symp.: 1981 p 8-11 refs In GERMAN (For primary document see N82-29820 20-47)
Avail: Issuing Activity

Natural science research in Bavaria is placed in historical context. The year 1772 saw the inauguration of the Hohenpeissenberg as a center of study with the construction of an astronomical observatory. Joint observations with reference to meteorological parameters, extending across territorial boundaries, was introduced in 1790, a project in which the Hohenpeissenberg group participated. After a period of difficulties, the Astronomical Accademy of Munich took over the Hohenpeissenberg installation in 1838. In 1878, the station came under the jurisdiction of the Royal Meteorological Central Station. The German Meteorological Service modernized Hohenpeissenberg Observatory in 1964, providing a platform from which various scientific investigations are carried out. Author (ESA)

N82-29822 Weltorganisation fuer Meteorologie, Genf (West Germany). Hydrology and Water Resources Dept.
SIGNIFICANCE OF AREAL RADAR RAINFALL MEASUREMENTS FOR HYDROLOGY [BEDEUTUNG VON RADARFLAECHENNIEDERSCHLAGSMESSUNGEN FUER DIE HYDROLOGIE]
Jaromir Nemec *In* Deut. Wetterdienst Ann. of Meteorol. No. 17. Celebration Symp.: 1981 p 12-16 refs In GERMAN (For primary document see N82-29820 20-47)
Avail: Issuing Activity

Radar area precipitation measurement as basic data for hydrological purposes is reviewed. User requirements for this kind of measurement are outlined and an analysis of possible errors is broken down by source. Maximizing the usefulness of radar rainfall data is discussed. Areal rainfall measurements by a rain gage calibrated radar system and rain gage network of various densities are compared. Integration of radar and rain gage data for improved rainfall measurement is treated, taking the accuracy of reservoir inflow forecasts as an example.
Author (ESA)

N82-29823 Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Atmosphaerenphysik.
THE OZONE LAYER OF THE ATMOSPHERE: ITS INVESTIGATION AND ITS SIGNIFICANCE [DIE OZONSCHICHT DER ATMOSPHAERE, IHRE ERFORSCHUNG UND IHRE BEDEUTUNG]
Hans-Ulrich Duetsch *In* Deut. Wetterdienst Ann. of Meteorol. No. 17. Celebration Symp.: 1981 p 16-22 refs In GERMAN (For primary document see N82-29820 20-47)
Avail: Issuing Activity

The atmospheric ozone layer is studied. Upper atmospheric ozone and meteorology of the lower stratosphere are discussed. The reactions of classical photochemical theory are recalled. Theory and observation of the total ozone layer over the year are corrected, showing dependance on latitude. The vertical distribution of ozone, according to photochemical theory, and a strict dependence on reaction time is illustrated. Ozone transport and transport of trace elements are mentioned. Analysis reveals a stratospheric sink for chlorofluoromethanes which leads to chlorine atom catalyzed destruction of ozone. Author (ESA)

N82-29824# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
CUMULUS MOMENTUM TRANSPORTS IN TROPICAL CYCLONES
Cheng-Shang Lee [1982] 82 p refs
(Contract N00014-C-0793)
(Rept-341; ISSN-0067-0340) Avail: NTIS HC A05/MF A01

The net influence of sub-grid or smaller unresolvable scale processes on the angential momentum field in tropical cyclones was calculated as a residual from the grid-scale momentum budgets of sixteen rawinsonde composite data sets. A simple

cloud model was developed to diagnose momentum rearrangement in the vertical through mass recycling. Model results agree well with the residual calculations from the composites. The total convective effect is found to reduce both the low level cyclonic and the upper level anticyclonic winds. These results imply that the net effect of the cumulus convective transport, defined as cumulus friction, is down-gradient and acts to reduce the vertical wind shear of the cyclone. This mutual interaction between the cumulus convection and the larger scale flow features and their possible influence on tropical cyclone development is discussed. Author

N82-29825# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.

TROPICAL CYCLONE MOVEMENT AND SURROUNDING FLOW RELATIONSHIPS

Johnny C. L. Chan and William M. Gray May 1982 72 p refs

(Contract N00014-C-0793)

(Rept-343) Avail: NTIS HC A04/MF A01

The relationship between the movement of tropical cyclones and the large-scale circulation which surrounds them was studied. Cyclones were stratified by direction and speed of movement, latitude, intensity change, and size (as determined by the readius of the outermost closed surface isobar) in three ocean basins: the northwest Pacific, the west Atlantic and the Australian-south Pacific region. Twenty-one different stratifications are available in the northwest Pacific, 13 in the west Atlantic, and 6 in the Australian-south Pacific area. Cyclone movement and surrounding flow relationships were studied at different pressure levels and a variety of radii. Pressure-weighted layer-averages were also analyzed in search for such relationships. Author

N82-29826*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

USER'S GUIDE FOR THE SOLAR BACKSCATTERED ULTRAVIOLET (SBUV) INSTRUMENT FIRST YEAR OZONE-S DATA SET

A. J. Fleig, K. F. Klenk, P. K. Bhartia, D. Gordon, and W. H. Schneider Jun. 1982 69 p refs Prepared in cooperation with Systems and Applied Sciences Corp., Bladensburg, Md.

(Contract NAS5-26753)

(NASA-RP-1095; Rept-82FO136; NAS 1.61:1095) Avail: NTIS HC A04/MF A01 CSCL 04B

Total-ozone and ozone vertical profile results for Solar Backscattered Ultraviolet/Total Ozone Mapping Spectrometer (SBUV/TOMS) Nimbus 7 operation from November 1978 to November 1979 are available. The algorithm used have been thoroughly tested, the instrument performance has been examined in details, and the ozone results have been compared with Dobson, Umkehr, balloon, and rocket observations. The accuracy and precision of the satellite ozone data are good to at least within the ability of the ground truth to check and are self-consistent to within the specifications of the instrument. The 'SBUV User's Guide' describes the SBUV experiment and algorithms used. Detailed information on the data available on computer tape is provided including how to order tapes from the National Space Science Data Center. J.M.S.

N82-29827*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

ATMOSPHERIC OBSERVATIONS FOR STS-3 LANDING

Robert E. Turner (Computer Sciences Corp., Huntsville, Ala.), James E. Arnold, Gregory S. Wilson, and Wade Batts Jun. 1982 31 p refs

(NASA-TM-82481; NAS 1.15:82481) Avail: NTIS HC A03/MF A01 CSCL 04B

Synoptic weather conditions existing over the western United States for the time of Shuttle descent are presented. The techniques and methods used to furnish synoptic atmospheric data at the surface and aloft for flight verification of the STS 3 orbiter during its descent are specified. Examples of the upper level data set are given. S.L.

N82-29828# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A 2 1/2 DIMENSIONAL MODEL FOR NUMERICAL WEATHER PREDICTION OVER BRAZIL

Chandrakanta M. Dixit and Wolodymir Boruszewski Feb. 1982 56 p refs Presented at the I Congresso Brasileiro de Meteorologia, Compina Grande, Sep. 1980

(INPE-2317-PRE/076) Avail: NTIS HC A04/MF A01

A 2 1/2 dimensional model for numerical weather prediction over Brazil using a limited amount of data is described and compared to a quasi-geostrophic model in the advantages it offers. The model accepts as input winds at 2 levels (300 mb and 700 mb) together with boundary values of the geopotentials at the same levels over a limited area. It proceeds to give a short range forecast for the winds (including the divergent components) at 300 and 700 mb together with the vertical velocity field at the 500 mb level. Two cases (one with 3 consecutive days of data and the other with 2 consecutive days of data) were integrated to test the functioning of the model. The results of the 24 h and 48 h forecast comparison, both from the synoptic point of view and from a numerical point of view, are presented at the end of the work together with figures giving the forecast stream functions. Author

N82-29829# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

INTERANNUAL AND SEASONAL VARIATION IN THE ENERGETICS OF THE ATMOSPHERE OVER NORTHEAST BRAZIL

Valdo silva Marques (Universidade Federal do Rio de Janeiro), V. Brahmananda Rao, and Luiz Carlos B. Molion Mar. 1982 47 p refs Submitted for publication

(INPE-2358-PRE/094) Avail: NTIS HC A03/MF A01

Interannual and seasonal variations of energetics over Northeast Brazil are discussed. A cylindrical boundary having 11 aerological stations was studied. Mass and energy fluxes are evaluated for the dry and wet seasons and also for the dry and wet years. During the wet period there is inward mass flux in the lower levels and outward mass flux in the upper levels. During the dry period there is inward mass flux in the middle levels with outward mass flux above and below. Variations in the vertical profiles of the energy parameters suggest that the rainfall variations in the NE Brazil are not of local origin but are connected to the variations of the general circulation in the tropics. Water vapor flux calculations showed that during the wet period there is a net import of water vapor and during the dry period there is a net export. S.L.

N82-29830# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PRECURSORS OF TWO SEVERE FREEZES IN BRAZIL

Michael A. Fortune and Vernon E. Kousky Mar. 1982 51 p refs Submitted for publication

(INPE-2342-PRE/086) Avail: NTIS HC A04/MF A01

Two freezes with repercussions on world coffee markets struck Brazil. Data from satellites and buoys were analyzed for early warning signs of a freeze. Two important precursors were found: (1) slowly moving long wave pattern in the central South Pacific Ocean amplified greatly two days before frontogenesis in South America and four to five days before the freezes in Brazil, and (2) the long wave ridge, when at maximum amplitude, was located near the southern Andes, and the next long wave trough downstream was located in the South Atlantic at the longitude of Brazil. This configuration channelled subantarctic air northward entirely over land into subtropical latitudes. The long waves amplified, but the northern portion of the Atlantic trough became cutoff. With the passage of the cold core cutoff vortex through Brazil three days later, freezing temperatures struck a large swath north of the Tropic of Capricorn where a freeze is rare. S.L.

N82-29831# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A STUDY OF METEOROLOGICAL TIME SERIES. PART 3: THE SEASONAL CYCLE

Vernon E. Kousky and S. Srivatsangam Mar. 1982 28 p refs Submitted for publication

(INPE-2349-PRE/090) Avail: NTIS HC A03/MF A01

The annual cycle and its first three harmonics were extracted from the series as a seasonal cycle. The distributions of the annual and seasonal cycles were studied for the United States and its immediate surroundings. The results show that the annual and seasonal cycles are extremely important contributors to the

observed temperature and wind fields throughout the troposphere. In winter, the annual cycle establishes a west wind maximum in the subtropics, quite akin to the winter average jet stream. The annual cycle in the horizontal wind constitutes a trough over the central parts of the United States in winter and a ridge in the same area in summer. A possible reason for the relative weakness of the seasonal cycle in the meridional component of the wind, compared to that in the zonal component, is deduced to be Rossby wave propagation. Author

N82-29832# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GENERATION OF SUBSYNOPTIC UNSTABLE BAROCLINIC WAVES BY SURFACE FRICTION
Prakki Satyamurty Mar. 1982 15 p refs Submitted for publication
(INPE-2353-PRE/092) Avail: NTIS HC A02/MF A01

Inclusion of surface drag produces an additional growth rate peak at L sub x approximately 1000 km, even if the curvature of the basic zonal wind profile is not favorable and diabatic heating due to the liberation of latent heat not allowed for. The growth rate of this most unstable intermediate scale wave increases with surface drag and decreases with internal friction. This wave has amplitude maxima near the surface and at about 1.5 km. A uniform friction at all depths does not produce a second growth rate peak, but reduces the growth rate of the Eady mode. S.L.

N82-29833# Air Weather Service, Scott AFB, Ill.
CLIMATOLOGY HANDBOOK FOR NORTHAG FORWARD AREAS Final Report
Jan. 1982 128 p refs
(AD-A114728; AD-E850160; AWS/TN-82/002) Avail: NTIS HC A07/MF A01 CSCL 04/2

Publication provides climatology of significant weather conditions that can be expected to impact on tactical operations in NORTHAG Forward Areas. GRA

N82-29834# Dugway Proving Ground, Utah.
PERFORMANCE OF TEMPERATURE/DEW POINT INSTRUMENTS. METHODOLOGY INVESTIGATION Final Report
Christopher A. Biltoft Apr. 1982 48 p refs
(AD-A114977; DPG-FR-82-703) Avail: NTIS HC A03/MF A01 CSCL 04/2

A series of field trials was conducted to assess the performance of temperature/dew point systems. Data quality was degraded by noise, calibration drift, and exposure to adverse ambient conditions. Improved noise reduction procedures, particularly improved computer program noise filters, are needed. Calibration drift can be detected by comparison with a standard in the field or by deployment of instruments in pairs at one level. Exposure to adverse ambient conditions can be avoided by proper test planning and execution. Operated under favorable ambient conditions, dew cell hygrometers provided useful average dew points where great accuracy is not required. Optical condensation hygrometers responded faster and more accurately than the dew cell hygrometers. However, the temperature sensing system in the optical condensation hygrometers was inaccurate and unreliable. The thermistor temperature sensing system performed well during this test, but the data were severely damped. Author

N82-29835# Lincoln Lab., Mass. Inst. of Tech., Lexington.
COORDINATED RADAR AND AIRCRAFT OBSERVATIONS OF TURBULENCE
Melvin Labitt 26 May 1981 44 p refs
(Contracts DTFA01-80-Y-10546; F19628-80-C-0002)
(AD-A114708; ATC-108; FAA-RD-81-44) Avail: NTIS HC A03/MF A01 CSCL 04/2

Interim results of a program to measure and correlate radar and aircraft sensed turbulence in rainstorms are presented. The dissipation factor of a turbulent air mass can be measured by an aircraft and a weather radar. Comparisons are made between precipitation reflectivity and spectral width measurements as indicators of turbulence. The instrumentation and data processing procedures are described. Examples of turbulence observations made with a storm penetrating aircraft and the weather radar are given. The relationship between the radar observations and the physical properties of the turbulent atmosphere are derived. The relationship of radar spectral width (variance) to turbulence intensity is discussed. Author (GRA)

N82-29836# Hawaii Univ., Honolulu.
ON THE SPEED OF RECURVING TYPHOONS OVER THE WESTERN NORTH PACIFIC OCEAN Final Report, 1970-1979
Cheng-Lan Bao and James C. Sadler Monterey, Calif. Naval Environmental Prediction Research Facility Mar. 1982 65 p refs
(Contract N00228-80-C-RW54)
(AD-A114556; UHMET-81-06; NEPRF-CR-82-05) Avail: NTIS HC A04/MF A01 CSCL 04/2

Characteristics of recurving typhoons, near and after the time of recurvature are considered. Three recurving typhoons which produced large forecast errors after recurvature were selected for case studies in search of aids for anticipating the acceleration in speed of movement after recurvature. Analyses of the upper troposphere poleward of the typhoons revealed a good relation between the future storm speed and the averaged wind speed between 500 and 200 mb, observed, at and 12 hours prior to recurvature, along the future storm track. Author

N82-29837# California Univ., Berkeley. Lawrence Berkeley Lab. Office of Energy Efficient Buildings Program.
DEVELOPMENT AND USE OF A HEMISPHERICAL SKY SIMULATOR M.A. Thesis
Mojtaba Mavvab Oct. 1981 266 p refs
(Contract W-7405-eng-48)
(DE82-005842; LBL-13400) Avail: NTIS HC A12/MF A01

The design, construction, and calibration of a sky simulator are reported. The configuration chosen employs an opaque reflecting dome structure. A procedure is developed for a lighting system that provides the desired luminance distribution, and the design of the sky simulator and of a direct Sun simulator included are described. Capabilities of the system to simulate overcast, uniform, and clear-sky conditions are discussed along with the accuracy of the system. Operation of the facility for instruction and research uses is discussed. DOE

N82-29838# National Weather Service, Salt Lake City, Utah.
VERIFICATION OF 72-HOUR 500-MB MAP-TYPE PREDICTIONS
R. F. Quiring Nov. 1981 30 p refs
(PB82-158098; NOAA-TM-NWS-WR-171; NOAA-81120309) Avail: NTIS HC A03/MF A01 CSCL 04B

Verification of 72-hour map type forecasts is compared with shorter period forecasts for the winter season 1976/77. The 72-hour 500 mb PE prognostications are fairly good with the long waves (large scale features). This verification should serve as an objective verification of 72 hour forecasts since the long waves are handled best by both the map types and the 72 hour forecasts, and the map types minimize the short waves which are a weakness in the 72 hour forecasts. GRA

N82-29839# National Weather Service, Honolulu, Hawaii. Hurricane Center.
A HISTORY OF TROPICAL CYCLONES IN THE CENTRAL NORTH PACIFIC AND THE HAWAIIAN ISLANDS 1832-1979
Samuel L. Shaw Sep. 1981 145 p refs
(PB82-162991; NOAA-S/T-81-168; NOAA-81120314) Avail: NTIS HC A07/MF A01 CSCL 04B

The meteorological characteristics and effects of tropical cyclones which have occurred in the Central North Pacific before 1980 are summarized. The major objectives are to: summarize historical data concerning tropical cyclones in the Central North Pacific; note the effects of damaging surf, hurricane-force winds, and torrential rains related to past tropical cyclones in the Hawaiian Islands; and discuss past effects of tropical cyclone activity in the Central North Pacific on agriculture, aviation, military activities and shipping. GRA

N82-29840# National Weather Service, Kansas City, Mo. Scientific Services Div.
THE UTILIZATION OF LONG TERM TEMPERATURE DATA IN THE DESCRIPTION OF FORECAST TEMPERATURES

Arno Perlow Nov. 1981 40 p refs
(PB82-163064; NOAA-TM-NWS-CR-65; NOAA-81120308)
Avail: NTIS HC A03/MF A01 CSCL 04B

The process of choosing descriptive adjectives for temperature forecasts was objectified. The monthly means and the distribution of temperature values which vary a great deal from season to season were analyzed. The 'seasonal normal' temperature range has a much greater span in the winter months than during the summer season. To get a more positive picture of what should be considered a normal temperature range and what constitutes a significant deviation from the normal, it was decided to look at an extensive time series of the daily maximum and minimum temperature data. A tape of daily Columbia, Missouri data for the period 1900-1979 was used to analyze the data. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N82-29841# Skidaway Inst. of Oceanography, Savannah, Ga.
NEARSHORE TRANSPORT PROCESSES AFFECTING THE DILUTION AND FATE OF ENERGY RELATED CONTAMINANTS Progress Report, 1 Oct. 1980 - 31 May 1982
J. O. Blanton 1 Dec. 1981 40 p refs
(Contract DE-AS09-80EV-10331)
(DE82-010311; DOE/EV-10331/2) Avail: NTIS
HC A03/MF A01

Energy related activities in the South Atlantic Bight resulting in increased transport and handling of fossil fuels and nuclear material are described. These activities can result in elevated concentrations of pollutants whose transport and fate are governed by oceanographic processes. Research progress toward an understanding of the tidal and wind generated circulation patterns that govern transport and fate of material are discussed. DOE

N82-29842# California Univ., Santa Cruz. Science Writing Program.
HISTORICAL COASTAL EROSION, A MANUAL FOR RESEARCHING
Kim Fulton and Julie Olfe, ed. 1981 67 p refs
(Contract NA80AA-D-00120)
(PB82-156803; T-CSGCP-003) Avail: NTIS
HC A04/MF A01 CSCL 08C

A manual to help land use planners, geologists, engineers, and others concerned with coastal erosion to collect historical information about shoreline, sea bluff, and cliff retreat is presented. Cross-correlation between sources and careful interpretation of data to rigorously document historical coastal changes in California over the last 100 to 150 years are emphasized. Basic sources and investigation methods are described. Methods for applying historical erosion research to coastal planning are discussed. GRA

N82-29843*# National Marine Fisheries Service, Bay Saint Louis, Miss. Fisheries Center.
MAPPING OF SUBMERGED VEGETATION USING REMOTE SENSING TECHNOLOGY
Kenneth J. Savastano, Kenneth H. Faller, Louis W. McFadin, and Hillman Holley Sep. 1981 104 p refs Sponsored in part by NASA
(NASA-CR-169104; NAS 1.26:169104; PB82-163072; NOAA-TM-NMFS-SEFC-73; NOAA-81120307) Avail: NTIS
HC A06/MF A01 CSCL 08A

Techniques for mapping submerged sea grasses using aircraft supported remote sensors are described. The 21 channel solid state array spectroradiometer was successfully used as a remote sensor in the experiment in that the system operated without problem and obtained data. The environmental conditions of clear water, bright sandy bottom and monospecific vegetation (Thalassia) were ideal. GRA

N82-29844# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
PHYSICAL OCEANOGRAPHIC DATA COLLECTED IN THE TROPICAL SOUTH ATLANTIC
Carol Roeffer, Kathy Callery, Mayra C. Pazos, and Robert L. Molinari Nov. 1981 149 p refs
(PB82-158809; NOAA-TM-ERL-AOML-47; NOAA-81120401)
Avail: NTIS HC A07/MF A01 CSCL 08J

The data of three cruises to the tropical South Atlantic Ocean during January - February 1979, July 1979 and February - March 1980 are presented. Data were collected as part of the ocean thermal energy conversion (OTEC) program, and the First GARP Global Experiment (FGGE). The data fulfill an OTEC requirement for physical oceanographic data in the South Atlantic south of about 4 degrees S, to evaluate the potential of various sites for OTEC operations. GRA

N82-29845# South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Research Inst.
SOUTH ATLANTIC OCS AREA LIVING MARINE RESOURCE STUDY. VOLUME 1: AN INVESTIGATION OF LIVE BOTTOM HABITATS SOUTH OF CAPE FEAR, NORTH CAROLINA Final Report
Oct. 1981 329 p refs 4 Vol.
(Contract DI-AA551-CT9-27)
(PB82-160102; BLM/YL/ES-81-09) Avail: NTIS
HC A15/MF A01 CSCL 08A

Benthic and nektonic communities associated with representative live bottom habitats on the continental shelf of the South Atlantic Bight were characterized. Factors which might influence these communities, particularly the potential for impact by offshore oil and gas activities were studied. Nine live bottom areas located off South Carolina, Georgia and Florida were studied. GRA

N82-29846# South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Research Inst.
SOUTH ATLANTIC OCS AREA LIVING MARINE RESOURCES STUDY. VOLUME 2: AN INVESTIGATION OF LIVE BOTTOM HABITATS NORTH OF CAPE FEAR, NORTH CAROLINA Final Report
Oct. 1981 146 p refs 4 Vol.
(Contract DI-AA551-CT9-27)
(PB82-160110; BLM/YL/ES-81-10) Avail: NTIS
HC A07/MF A01 CSCL 08A

Benthic and nektonic communities associated with representative live bottom habitats on the continental shelf of the South Atlantic Bight were studied. Factors which might influence these communities, particularly the potential for impact by offshore oil and gas activities were studied. Three study sites at the edge of the continental shelf in a 55-100m depth zone, near Cape Fear, North Carolina were studied. GRA

N82-29847# South Carolina Wildlife and Marine Resources Dept., Charleston.
SOUTH ATLANTIC OCS AREA LIVING MARINE RESOURCES STUDY. VOLUME 3: APPENDICES Final Report
Oct. 1981 197 p refs
(Contract DI-AA551-CT9-27)
(PB82-160128; BLM/YL/ES-81-11) Avail: NTIS
HC A09/MF A01; also available in set of 4 reports E99 as PB82-160086 CSCL 08A

Data utilized for the analyses of the South Atlantic Outer continental shelf living marine resource study are reported. Data obtained from nine areas near Cape Fear, North Carolina are also included. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N82-29848*# George Washington Univ., Washington, D.C. Dept. of Medical and Public Affairs.
BIOMEDICAL RESEARCH PUBLICATIONS: 1980 - 1982 Final Report
Linda Pleasant and Letty Limbach Washington NASA Jul. 1982 49 p
(Grant NASw-3165)
(NASA-CR-3587; NAS 1.26:3587) Avail: NTIS
HC A03/MF A01 CSCL 06C

Publications concerning the major physiological and psychological problems encountered by man when he undertakes space flight are listed. Nine research areas are included: cardiovascular deconditioning, motion sickness, bone alterations, muscle atrophy, blood cell alterations, fluid and eletrolyte changes, radiation effects and protection, behavior and performance, and general biomedical research. N.W.

N82-29849# Army Research Inst. of Environmental Medicine, Natick, Mass. Heat Research Div.

HYPO-AND HYPERGLYCEMIA IN RATS: EFFECTS ON THE ABILITY TO WORK IN THE HEAT

Ralph P. Francesconi and Milton Mager 3 Feb. 1982 25 p refs

(DA Proj 3E1-61102-BS-10)

(AD-A111711; USARIEM-M-15/82) Avail: NTIS HC A02/MF A01 CSCL 06/19

To investigate the hypothesis that circulating glucose levels may affect exercise performance and the severity of hyperthermic injury, rats were made hypoglycemic (IV insulin, 4U) or hyperglycemic (IP glucose, 750mg) before exercise in the heat to hyperthermic exhaustion (Tre = 42.5 -43 C). The endurance capacity of rats administered glucose was significantly greater than that of insulin treated, while neither was different from saline treated controls. Hematocrit levels were unaffected by exercise in control and insulin treated rats, but were significantly increased in the glucose treated. Lactate levels were increased postrun in all groups, and these increments were exacerbated in glucose treated rats. Glucose levels prerun were decreased by insulin and increased by glucose, and remained depressed postrun in the insulin treated group. Potassium concentrations were reduced by insulin administration. Creatine phosphokinase, urea nitrogen, and creatinine were increased postrun in all groups. Mortality rates following heat/exercise injury were unaffected by glucose levels. We concluded that while hyperglycemic rats had increased endurance when compared to hypoglycemic animals, the severity of the hyperthermic injury was unaffected by circulating glucose levels. Author (GRA)

N82-29850# VSE Corp., Alexandria, Va.

TECHNICAL ASSESSMENT OF THE PREVENTION OF MICRO-FOULING ON OTEC HEAT-TRANSFER SURFACES THROUGH THE USE OF ULTRAVIOLET RADIATION Final Report

G. A. Garrigan, R. P. Schmitt, and V. J. Ciccone (Ciccone (V. J.) and Associates, Inc., Woodbridge, Va.) Sep. 1981 95 p refs (Contract DE-AC02-78ET-21002)

(DE82-005489; DOE/ET-21002/T21) Avail: NTIS HC A05/MF A01

To reduce or eliminate biofouling by microorganisms, seawater entering heat exchangers is sterilized (or at least sanitized) by UV radiation at 253.7 nm. The feasibility of applying this technology to OTEC is examined. Calculations based on the Lambert-Beer equation and reasonable assumptions about seawater quality and the intensity of irradiation obtainable from a UV lamp suggest seawater is transparent enough to a collimated beam of UV light to deliver effective germicidal doses to nearly 150 cm under some conditions. However, the practical limit on the depth of effective radiation from commercial lamps is severely restricted by many factors including the natural divergence of light, absorption and scattering in the media, intensity of radiation from the light source and so forth. Even under very favorable conditions a common design allowing UV light to penetrate 30 cm of water would have to permit the water at that distance to be in contact with the light for 20 seconds or so to deliver the germicidal effect of high quality sanitization but not necessarily sterilization. DOE

N82-29851# Argonne National Lab., Ill. Components Technology Div.

OTEC-1 POWER SYSTEM TEST PROGRAM: BIOFOULING AND CORROSION MONITORING ON OTEC-1

A. P. Gavin and T. M. Kuzay Sep. 1981 53 p refs (Contract W-31-109-eng-38)

(DE82-007035; ANL/OTEC-BCM-027) Avail: NTIS HC A04/MF A01

Biofouling and corrosion experiments performed on board the ocean energy converter during the OTEC-1 deployment are summarized. The equipment installed for the experiments, details of the operating history of the experiments, and results obtained are described. DOE

N82-29852# California Univ., Berkeley. Lawrence Berkeley Lab. Chemical Biodynamics Div.

ORIENTATION AND ENERGY-TRANSFER STUDIES ON CHLOROPHYLL IN THE PHOTOSYNTHETIC MEMBRANE Ph.D. Thesis

John Arthur Nairn Dec. 1981 216 p refs (Contract W-7405-eng-48)

(DE82-010180; LBL-13827) Avail: NTIS HC A10/MF A01

The two methods of study used for the light reactions of photosynthesis are orientation dependent spectroscopy and picosecond resolution of the fluorescence decay kinetics. Analysis of spectroscopic measurements on complex partially ordered ensembles, such as photosynthetic systems, is usually limited by knowledge of the orientational distribution function. A new method of parametrically representing the distribution function using a physical model of the partially ordered ensemble is described. The parametric representation of the distribution function is the density of states function. Many formulas are included which can be used to calculate density of state functions for a large range of problems. Fluorescence decay kinetics in chloroplasts from green plants and algae are investigated using a synchronously pumped, mode-locked dye laser as an excitation source. DOE

N82-29853# Joint Publications Research Service, Arlington, Va.

USSR REPORT. LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 17

2 Aug. 1982 110 p refs Transl. into ENGLISH from various Russian publications

(JPRS-81419) Avail: NTIS HC A06/MF A01

Advances in biotechnology and radiation biology are addressed. Emphasis is placed on analysis of the environment to detect air and water pollution and the biological effects of irradiation and long term exposure to low doses of gamma radiation. Other topics covered include biochemistry, medicine, microbiology, pharmacology, physiology and psychiatry. For individual titles, see N82-29854 through N82-29856.

N82-29854# Joint Publications Research Service, Arlington, Va.

USE OF GAS CHROMATOGRAPHY TO ANALYZE THE ENVIRONMENT (1978-1980 LITERATURE SURVEY) c45

S. F. Yavorovskaya *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 17 (JPRS-81419) 2 Aug. 1982 p 22-31 refs Transl. into ENGLISH from Gig. Tr. Prof. Zabol. (USSR), no. 10, Oct. 1981 p 35-40 (For primary document see N82-29853 20-51)

Avail: NTIS HC A06/MF A01

Application of gas chromatography to pollution monitoring in air and in water is discussed. Advantages of the method addressed include the relatively low levels that can be detected, high degree of selectivity, and feasibility of analysis of multicomponent mixtures. A literature survey of material dealing with analysis of air and water utilizing gas chromatography to identify impurities is presented. J.M.S.

N82-29855# Joint Publications Research Service, Arlington, Va.

ATTENUATION OF RADIOPROTECTIVE EFFECTS OF ACUTE HYPOXIA ON ANIMALS ADAPTED TO HIGH ALTITUDES

P. Kazymbetov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 17 (JPRS-81419) 2 Aug. 1982 p 76-79 refs Transl. into ENGLISH from Med. Radiol. (USSR), v. 27, no. 3, Mar. 1982 p 60-62 (For primary document see N82-29853 20-51)

Avail: NTIS HC A06/MF A01

The range of modification of radiosensitivity by acute hypoxia (6% oxygen) in animals adapted to high altitudes was investigated. Experiments were conducted on mongrel white rats and mice kept at an altitude of 3340 m above sea level for 40 days and on a control group kept at 800 m above sea level. The animals were irradiated in air and under hypoxic

conditions. Animal survival for 30 days after irradiation and quantity of bone marrow cells in one thigh on the third postirradiation day served as criteria of radiosensitivity. The toxicity of acute hypoxia for control and adapted animals was also tested. The attenuation of radioprotective effects of acute hypoxia was demonstrated. It was also demonstrated that the diminished effect of acute hypoxia persists for several days after adaptation. Also, results show that adapted animals were twice as resistant to acute hypoxia as control animals. J.M.S.

N82-29856# Joint Publications Research Service, Arlington, Va.

CYTOGENETIC ANALYSIS OF PERIPHERAL BLOOD LYMPHOCYTES OF INDIVIDUALS EXPOSED TO LOW DOSES OF IONIZING RADIATION **c52**

S. P. Petrova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 17 (JPRS-81419) 2 Aug. 1982 p 80-84 refs Transl. into ENGLISH from Med. Radiol. (USSR), v. 27, no. 3, Mar. 1982 p 70-72 (For primary document see N82-29853 20-51)

Avail: NTIS HC A06/MF A01

The peripheral blood of 30 men who had been exposed to external gamma radiation over an extended period of time was analyzed. The incidence of chromosomal abberrations in the peripheral blood lymphocytes was examined. Findings revealed that there was no appreciable change in the incidence of structural abberations in peripheral blood lymphocytes with chronic exposure to radiation in low doses as compared to the spontaneous level. J.M.S.

N82-29857# Joint Publications Research Service, Arlington, Va.

USSR REPORT. LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 18

3 Aug. 1982 111 p refs Transl. into ENGLISH from various Russian publications

(JPRS-81428) Copyright. Avail: Issuing Activity

Investigations in virology, cloning, echolocation, artificial hearts, and medical demography are reported. The effects of laser transmission on humans, analysis of taste perception, and the use of computer to quantitatively estimate hoarseness are other areas of interest discussed. For individual titles, see N82-29858 through N82-29861.

N82-29858# Joint Publications Research Service, Arlington, Va.

THEORETICAL AND PRACTICAL ASPECTS OF USING ACOUSTIC REPELLANTS TO SCARE BIRDS. PART 1: INTERSPECIFICITY AND GEOGRAPHIC (REGIONAL) DISTINCTIONS OF ACOUSTIC REPELLANTS

A. V. Tikhonov and V. S. Shevyakov *In its* USSR Rept.: Life Sci. Biomed and Behavioral Sci., No. 18 (JPRS-81428) 3 Aug. 1982 p 43-48 refs Transl. into ENGLISH from Biol. Nauki (USSR), no. 1, Jan. 1982 p 45-49 (For primary document see N82-29857 20-51)

Avail: Issuing Activity

The interspecificity of alarm and distress signal effects on Larines, Corvidae and starlings was investigated as well as geographic aspects of using these signals as acoustic repellants. It was established that repellant reactions are induced in birds by signals not only of closely related species, but of systematically distant groups that are biocenotically close neighbors. The interspecificity of repellant signals is manifested the most during the nesting period. Author

N82-29859# Joint Publications Research Service, Arlington, Va.

ELECTROMETRIC INVESTIGATION OF HUMAN GUSTATORY ANALYZER UNDER NORMAL CONDITIONS AND IN SIMULATED WEIGHTLESSNESS **c52**

I. Ya. Yakovleva *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-81428) 3 Aug. 1982 p 73-76 refs Transl. into ENGLISH from Otorinolaringol. (USSR), no. 2, Mar. - Apr. 1982 p 15-17 (For primary document see N82-29857 20-51)

Avail: Issuing Activity

Altered perception of the taste of food took place in a number of cosmonauts and also in healthy individuals when some of the effects of weightlessness were simulated on Earth. Electrometrical investigation of taste was used to study the gastrolingual reflex and apparently can be performed by the subjects themselves. In this connection, the method is of interest for space medicine. A.R.H.

N82-29860# Joint Publications Research Service, Arlington, Va.

SIGNIFICANCE OF MINUTE VOLUME PARAMETERS TO EVALUATION OF VESTIBULAR STABILITY **c52**

A. S. Gusarov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-18428) 3 Aug. 1982 p 88-91 Transl. into ENGLISH from Voyenno-Med. Zh. (USSR), no. 8, Aug. 1981 p 48-50 (For primary document see N82-29857 20-51)

Avail: Issuing Activity

Respiration rate, minute volume, heart rate, and EKG were recorded in 100 men between 22 and 35 years of age using an automatic vestibular chair to which was connected a Fizilog instrument with Reservy unit, a digital printer, and a 12 channel magnetoelectric oscillograph. A 5 minute test for endurance of cumulative Coriolis accelerations with intermittent exposure was used to study vestibulovegetative reflexes. Subjects were grouped according to: (1) high vestibulovegetative reactions; (2) moderate stability; and (3) poor motion tolerance. More than 3,000 vestibulovegetative reactions were recorded. Results show that the first group of subjects endured the 5 min test without complaints or external vestibulovegetative manifestations. The second group presented moderate pallor, perspiration and nausea, mainly in the 3d-5th min before stopping and after stops. Marked autonomic reactions were (pallor, cold sweat, nausea, vomiting) were observed in the third group either immediately after stopping the first time, or after the second-third time. A.R.H.

N82-29861# Joint Publications Research Service, Arlington, Va.

PHASE ANALYSIS OF DYNAMICS OF GALVANIC SKIN RESPONSES IN MAN **c52**

A. A. Krauklis, A. A. Aldersons, and I. A. Spandega *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-81428) 3 Aug. 1982 p 92-95 refs Transl. into ENGLISH from Iz. Akad. Nauk Latv. SSR (USSR), no. 2, Feb. 1981 p 123-125 (For primary document see N82-29857 20-51)

Avail: Issuing Activity

The influence of the heat factor and, in particular, ambient temperature on the appearance and dynamics of GSR in different parts of the human body both in a state of relative rest and with graded mental emotional and physical loads was studied. Results obtained using 1140 subjects of both sexes, ranging in age from 18 to 86 years, show that the dynamics of development of the galvanic skin response presents distinct phases which depend on ambient temperature, and emotional and physical tension. It was established that GSR dynamics undergo five phases with rapid elevation of temperature. A.R.H.

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N82-29862* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ACOUSTIC TOOTH CLEANER Patent

Joseph S. Heyman, inventor (to NASA) Issued 25 May 1982 5 p Filed 14 Aug. 1980 Supersedes N81-12734 (19 - 03, p 0392)

(NASA-Case-LAR-12471-1; US-Patent-4,331,422; US-Patent-Appl-SN-178193; US-Patent-Class-433-125; US-Patent-Class-433-118; US-Patent-Class-433-86; US-Patent-Class-128-62A) Avail: US Patent and Trademark Office CSCL 06B

An acoustic oral hygiene unit is described that uses acoustic energy to oscillate mild abrasive particles in a water suspension which is then directed in a low pressure stream onto the teeth. The oscillating abrasives scrub the teeth clean removing food particles, plaque, calculous, and other foreign material from tooth

surfaces, interproximal areas, and tooth-gingiva interface more effectively than any previous technique. The relatively low power output and the basic design makes the invention safe and convenient for everyday use in the home without special training. This invention replaces all former means of home dental prophylaxis, and requires no augmentation to fulfill all requirements for daily oral hygienic care.

Official Gazette of the U.S. Patent and Trademark Office

N82-29863* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

IMPLANTABLE ELECTRICAL DEVICE Patent

Murzban D. Jhabvala, inventor (to NASA) Issued 5 Jan. 1982 5 p Filed 27 May 1980 Supersedes N80-27073 (18 - 17, p 2329)

(NASA-Case-GSC-12560-1; US-Patent-4,308,868; US-Patent-Appl-SN-153246; US-Patent-Class-128-421) Avail: US Patent and Trademark Office CSCL 06B

A fully implantable and self contained device is disclosed composed of a flexible electrode array for surrounding damaged nerves and a signal generator for driving the electrode array with periodic electrical impulses of nanoampere magnitude to induce regeneration of the damaged nerves.

Official Gazette of the U.S. Patent and Trademark Office

N82-29864# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).

THE UTILIZATION OF MACROMOLECULES IN BLOOD PURIFICATION SYSTEMS

K. Takakura and Toshihide Nakashima 1982 31 p refs Transl. into ENGLISH from Kagaku Zokan (Japan), no. 84, 1980 p 141-152

(NRC/CNR-TT-2021; ISSN-0077-5606) Avail: NTIS HC A03/MF A01

The macromolecular membranes and adsorbents that play essential roles in blood purification sytems, as well as materials that are used to coat the adsorbents, are discussed. The KF 101 dialyzer employs hollow fibers made of an ethylene-vinyl alcohol copolymer (EVA). The DHP-1 blood purifier utilizes activated charcoal coated with hydroxyethyl methacrylate (HEMA). These macromolecules are discussed from the standpoint of their medical utility. N.W.

N82-29865*# Technology, Inc., Houston, Tex. Life Science Div.

NEUROCHEMICAL BACKGROUND AND APPROACHES IN THE UNDERSTANDING OF MOTION SICKNESS Final Report

Randall Lee Kohl Washington NASA Jul. 1982 54 p refs (Contract NAS9-14880)

(NASA-CR-3569; NAS 1.26:3569; S-515) Avail: NTIS HC A04/MF A01 CSCL 06P

The problems and nature of space motion sickness were defined. The neurochemical and neurophysiological bases of vestibular system function and of the expression of motion sickness were reviewed. Emphasis was given to the elucidation of the neuropharmacological mechanisms underlying the effects of scopolamine and amphetamine on motion sickness. Characterization of the ascending reticular activating system and the limbic system provided clues to the etiology of the side effects of scopolamine. The interrelationship between central cholinergic pathways and the peripheral (autonomic) expression of motion sickness was described. A correlation between the stress of excessive motion and a variety of hormonal responses to that stress was also detailed. The cholinergic system is involved in the efferent modulation of the vestibular hair cells, as an afferent modulator of the vestibular nuclei, in the activation of cortical and limbic structures, in the expression of motion sickness symptoms and most likely underscores a number of the hormonal changes that occur in stressful motion environments. The role of lecithin in the regulation of the levels of neurotransmitters was characterized as a possible means by which cholinergic neurochemistry can be modulated. Author

N82-29866# Army Research Inst. of Environmental Medicine, Natick, Mass.

DETERMINATION OF MAXIMAL AEROBIC POWER DURING UPPER BODY EXERCISE

Michael N. Sawka, Michael E. Foley, Nancy A. Pimental, Michael M. Toner, and Kent B. Pandolf 3 Feb. 1982 26 p refs (AD-A111712; USARIEM-M-14/82) Avail: NTIS HC A03/MF A01 CSCL 06/19

The purpose of this investigation was to evaluate four protocols for their effectiveness in eliciting maximal aerobic power (peak VO2) during arm crank exercise. Comparisons were made between: (1) a continuous (CON) and an intermittent (INT) protocol (both employed a crank rate of 50 rpm), and (2) the CON protocol employing crank rates of either 30, 50, or 70 rpm. For the first group of experiments no significant differences were found between the Con and INT protocols for peak VO2, maximal pulmonary ventilation (VEmax), maximal heart rate (HRmax) or maximal blood lactate (LAmax) responses. For the second group of experiments, the CON-50 was compared to the CON-30 and CON-70 protocols. In comparison to the CON-50, significantly higher peak VO2 (+10%) and VEmax (+14%) responses were elicited by the CON-70 protocol, whereas significantly lower peak VO2 (-11%), VEmax (-23%), HRmax (-8%), and LAmax (-29%) responses were elicited by the CON-30 protocol. These data indicate that for arm crank exercise the combination of a continuous design and a crank rate of 70 rpm provides the most effective protocol to elicit peak VO2 values. Author (GRA)

N82-29867# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

ALCOHOL-INDUCED PHYSIOLOGICAL DISPLACEMENTS AND THEIR EFFECTS ON FLIGHT RELATED FUNCTIONS

Michael T. Lategola, Peggy J. Lyne, and Mary J. Burr Mar. 1982 22 p refs

(AD-A114919; FAA-AM-82-3) Avail: NTIS HC A02/MF A01 CSCL 06/19

Tolerances of human subjects for orthostasis and physical work were determined at a simulated altitude of 3,048 m. Orthostasis was induced with a lower body negative pressure (LBNP) device and physical work was done on a pedal ergometer. Altitude was simulated in a hypobaric chamber. Tests were carried out under two experimental conditions: (1) after subjects drank an alcoholic beverage, or (2) after subjects drank a placebo beverage (no alcohol). The alcoholic beverage produced blood alcohol concentrations (BAC's) of about 90 mg/100 ml of blood (90 mg percent). At altitude, arterial oxyhemoglobin saturation (HbO2) remained adequately compensated but was lower after alcohol than after placebo intake. Arithmetic and eye/hand coordination performances were both significantly decreased after school. Ergometry, after alcohol, was well tolerated despite some decreased cardiorespiratory efficiency. The LBNP applied around peak BAC at altitude was tolerated without subjectively adverse symptoms despite significant decreases in several cardiovascular parameters. Cardiovascular adequacy along with maintained plasma volume around peak BAC appeared to be temporarily protective against orthostatic incapacitation during LBNP. Reversal of this temporary orthostatic protection during BAC recession is possible. Author (GRA)

N82-29868# Dayton Univ., Ohio. Research Inst.

SEGMENTATION AND ANALYSIS OF STEREOPHOTOMETRIC BODY SURFACE DATA Final Report

L. Douglas Baughman Wright-Patterson AFB, Ohio AMRL Apr. 1982 193 p refs

(Contract F33615-78-C-0504; AF Proj. 7231)

(AD-A114916; UDR-TR-81-51; AFAMRL-TR-81-96) Avail: NTIS HC A09/MF A01 CSCL 06/2

A stereophotometric data set, describing the body surface of a subject, was segmented into nineteen groups of stereophotometric data, the data in each group describing the surface of a body segment. The process was repeated for a total of 59 such data sets. The data resulting from each of these segmentation processes were then analyzed for inertial properties and location and orientation of both anatomical and principal axis systems. The accumulated body volume as a function of vertical distance from the floor was also tabulated for all the data sets.

Author (GRA)

N82-29869# Monsanto Research Corp., Dayton, Ohio.

SUPERIOR HEAT-TRANSFER FLUIDS FOR SOLAR HEATING AND COOLING APPLICATIONS. RESULTS OF ACUTE ORAL TOXICITY DETERMINATIONS Final Report, 15 Sep.

1980 - 30 Apr. 1981
Leo Parts and David L. Conine Nov. 1981 127 p Prepared jointly with Hill Top Research, Cincinnati
(Contract DE-AC04-78CS-35356)
(DE82-003071; MRC-DA-1096-Vol-2) Avail: NTIS HC A07/MF A01

Acute oral toxicity test were performed on heat transfer fluids. Results obtained for 23 fluid samples are presented.
L.F.M.

N82-29870# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
PHYSIOPATHOLOGY AND PATHOLOGY OF SPINAL INJURIES IN AEROSPACE MEDICINE
R. P. Delahaye and R. Auffret Feb. 1982 338 p refs
(AGARD-AG-250(Eng); ISBN-92-835-1415-7) Avail: NTIS HC A15/MF A01

The anatomy and biomechanics of the spine are reviewed and spinal stress in flight is described. The aetiology and pathogenesis of spinal fracture; the clinical examination and radiology of spinal trauma; postural disorders of helicopter and combat aircraft pilots; and flight fitness are considered. Medico-legal aspects of spinal disorders, including intervertebral arthritis, spondylolisthesis, and inflammatory rheumatic conditions are addressed. For individual titles, see N82-29871 through N82-29892.

N82-29871# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
ANATOMY OF THE SPINE
C. Kleitz and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 9-28 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The embryology of the spine; general and special regional characteristics of vertebrae; interconnections and articulations, the spine as a whole, and the spine in the seated position are depicted in anatomical drawings and described.
A.R.H.

N82-29872# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
BIOMECHANICS OF THE SPINE
C. Kleitz and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 29-45 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The spine has at least three basic biomechanical functions: (1) transmit the weight and the flexing movements of the head and the trunk to the pelvis; (2) allow physiological movement between the head, trunk, and pelvis; and (3) protect the spinal cord from trauma caused by forces and movements. The functional biomechanics of the intervertebral disk, the intervertebral ligaments, the vertebrae, and the spinal column are illustrated and discussed. The role of the thoracic cage and muscles is also examined.
A.R.H.

N82-29873# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SPINAL STRESSES IN FLIGHT
R. Auffret and H. Viellefond *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 47-54 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The spine of a pilot is subjected to two types of stresses: those inherent in flight which are of relatively low intensity and are related to the time for which they act; and those which are uncommon but of very high intensity whose effects are related to the mechanical strength of the spinal column and can lead to fractures. The former represent the problem of fatigue of materials; the latter the problem of the strength of materials. The physiological effects of aircraft acceleration and vibration during flight are analyzed. The mechanical effects on the human body of the very high accelerations (impacts) associated with ejection from high performance aircraft at high speed and during crash landings away from prepared runways are examined.
A.R.H.

N82-29874# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THEORIES OF THE PATHOGENESIS OF FRACTURES OF THE SPINE
R. P. Delahaye and P. J. Metges *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 57-59 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The mechanisms of fractures of the thoraco-lumber spine and of the cervical spine are distinguished. The different aetiological circumstances in which traumatic lesions occur (crash, parachuting, ejection, accidents in flight, accidents on centrifuges and sleds) are examined. Clinical studies and practical methods of examination that are often neglected are considered. Radiology must be carried out early, using optimal techniques to yield radiographs that, with the clinical examinations, can facilitate the establishment of an accurate inventory of the lesions. The numerous after-effects of trauma must be detailed, for they produce a very special clinical and radiological picture with which every flight surgeon should be thoroughly familiar.
A.R.H.

N82-29875# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AETIOLOGY AND PATHOGENESIS
R. P. Delahaye and R. Auffret *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 60-65 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Records of accident investigations of light civil aircraft, gliders, military aircraft, and civil and military transport aircraft show that the pathogenesis of fractures of the vertebral column and the associated lesions resulting from crashes is almost identical. The localization of spinal fractures in crashes, the forces and accelerations in crashes, and the effect of deceleration when the body is restrained by an abdominal belt are considered.
A.R.H.

N82-29876# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
HELICOPTER ACCIDENTS
B. Vettes and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 66-71 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The uses of helicopters in civil and military operations are reviewed and it is shown that the advantages of maneuverability, vertical take-off and landing, hovering, and the need for unsophisticated ground base contribute to the frequent, often serious accidents of these aircraft. Statistical studies of civil and military helicopters, and the distribution of vertebral fractures in helicopter accidents are discussed. The schematic division of crashes into ground impact in autorotation and crash with loss of control of aircraft corresponds to a distinction between crashes with the possibility of survival and unsurvivable crashes. The pathogenesis of vertebral lesions is discussed for crashes in which the impact is purely vertical (accident in autorotation) and crashes with a significant horizontal impact component (poor chance of survival). Case histories of crash injuries are used to show that the risk of fatal accidents, which is 0.34 per 10,000 flying hours, must be reduced.
A.R.H.

N82-29877# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
EJECTION OF PILOTS FROM COMBAT AIRCRAFT
R. P. Delahaye, R. Auffret, and B. Vettes *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 72-96 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The history of scientific studies of pilot escape, especially at high speeds from combat aircraft, is reviewed and the principles of the ejection seat are examined. The different phases of ejection (initiation; seat firing and egress from the aircraft; separation of the seat; landing; survival; and rescue) are described. Normal configurations, abnormal configurations and the extraction (YANKEE system) are discussed as well as the overall results of ejection and the results as a function of in-flight factors. The distribution of ejection lesions, and the pathogenic mechanisms of spinal fractures during ejection are examined. Parachute opening

shock and pathological factors associated with landing are also considered. A.R.H.

N82-29878# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
PARACHUTING
A. Leger and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 97-121 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The physiopathology and etiology of parachute descents are examined during (1) leaving the aircraft to parachute opening; (2) parachute opening; and (3) descent on the deployed parachute. Military parachuting techniques and training of military parachutists; and fracture and trauma of the spine during parachuting as a means of transport are examined. Other lesions and traumatic sequelae of parachuting are described. General conditions of parachuting as a sport, the equipment used, and spinal trauma in sport parachuting are also covered. Hang gliding and the limits of human tolerance for impacts in free fall are discussed. A.R.H.

N82-29879# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
LIMITS OF HUMAN TOLERANCE FOR IMPACTS IN FREE FALL
In its Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 122-126 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Various techniques used to study the degree of human resistance to impact during an unimpeded fall, jump, or dive from a known point to a know point are described. The physical factors which influence the nature, size, and severity of the lesions received are amplitude, direction of forces, distribution of forces, area of application, and duration. Biological factors (physical condition) are also closely related to impact tolerance. Injuries resulting from impacts into water and at terminal velocity are reported from case histories. A.R.H.

N82-29880# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
FRACTURES OF THE SPINE IN FLIGHT
R. P. Delahaye and R. Auffret *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 127-131 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Case histories show that fractures of the spine can occur in the pilot of combat aircraft during rapid vibrational phenomena (induced oscillation) and with inadvertent unlocking of the seat, an event which produces additional accelerations which lead to a sudden compression of the vertebral column. During turbulence, a flight attendant thrown against the wall or the seats of an aircraft sometimes receives a fracture of the spine. More rarely, cervical sprains occur during aerobatics. A.R.H.

N82-29881# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
ACCIDENTS IN CENTRIFUGES AND EXPERIMENTS (EJECTION SEAT TRAINING TOWERS, SLEDS)
R. P. Delahaye and R. Auffret *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 132-135 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The performance characteristics of the centifuge at CEV (Bretigny) are described as well as the protocol used. Results of studies at 6.5 G, 9 G, 11.5 G and 13.5 G are examined to indicate the types of injuries that occurred. Factors responsible for the low incidence of injuries on ejection seat training rigs and rocket sleds are mentioned. A.R.H.

N82-29882# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
CLINICAL EXAMINATION OF SPINAL INJURIES
P. Doury and G. Leguay *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 136-138 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Manipulation of the subject in the erect, sitting, or lying position occurs following history taking and precedes radiology. In case of severe injury, clinical examination must always be cautious, usually with the patient lying on his back. In the upright position, the patient is examined from the front, back, and side as well as while walking on the toes and heels. Procedures for examining the seated, supine, and prone patient should be followed by neurological and gynecological examination. The identification of thoraco lumbar and cervical fractures is described. It is indicated that simple fractures of the spine are clinically silent in 15% to 20% of cases and that the most searching examination cannot provide sufficient evidence to eliminate with certainty the fracture of the spinal column. A.R.H.

N82-29883# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
RADIOLOGY OF SPINAL TRAUMA IN AVIATION MEDICINE
R. P. Delahaye and P. J. Metges *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 139-186 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Radiological examination of the spine in aerospace medicine is the same as that of any recent spinal trauma, and it obeys the same principles. The examination is carried out as soon as possible after an aviation accident. The entire spine is X-rayed segmentally, with frontal and lateral films. The examination consists of diagnostic radiography and complementary radiological assessment (localized and oblique views, tomography, dynamic films, examinations with the contrast media, scanning). S.L.

N82-29884# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
ANALYTICAL STUDY OF TRAUMATIC LESIONS OF C3-C7
In its Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 187-198 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

In a frontal view in a neutral position, the spines are aligned, and the distances between them are more or less equal. Any deviation of the line of the spines is evidence of a unilateral dislocation, and increase in the distance between two spines always indicates a dislocation. In a straight lateral view, the articular processes are superimposed. If they appear are separated at a given level when they are superimposed below, a fracture of the articular processes is sought. The separation indicates a rotation. Traumatic lesions of the cervical spine are often unstable. This instability is not always evident on standard X-rays. It is sometimes necessary to carry out careful dynamic examinations on a second occasion. S.L.

N82-29885# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
RADIOLOGICAL STUDY OF FRACTURES OF C1 AND C2
In its Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 199-210 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Fractures of the axis and atlas of the C1 and C2 area represent 15 to 25% of the fractures of the cervical spine, and preferentially affect the odontoid. The angles from which the X-rays are taken must be strictly controlled. The frontal view can only be interpreted if the spinous process of C2 is projected on the center of the body atlas. In profile, in the normal state, the posterior border of the odontoid should lie on a straight line extended from that of the body. In contrast, the anterior border lies obliquely. The space between the anterior edge of the odontoid and the posterior border of the anterior arch of the atlas should not exceed 3 mm. The state of the soft tissues in front of the spine should always be carefully assessed. S.L.

N82-29886# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SEQUELAE OF VERTEBRAL FRACTURES AND TRAUMA
R. P. Delahaye and P. J. Metges *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 211-223 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The broad principles of treatment of traumatic lesions and fractures of the spine in aviation medicine are the same as those in general practice. A general scheme in accordance with the different philosophies of various schools of orthopaedic surgery, is presented and the very common thoraco-lumbar fractures of the spine are contrasted with the more severe fractures of the cervical spine. S.L.

N82-29887# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
BACKACHE IN HELICOPTER PILOTS
R. P. Delahaye, R. Auffret, P. J. Metges, J. L. Poirier, and B. Vettes *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 225-260 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Back pains in helicopter pilots are studied. These pains are usually caused by the vibrations of the helicopter. The picture is of a low grade, tiring, heavy ache localized in the lumbar region, or sometimes lower. It extends laterally, often predominantly to one side, and may radiate to the buttocks, the iliac crests or, more rarely, the groin. This discomfort is brought on by flight, aggrevated by lifting effort of by long car journeys, and relieved by lying down and by physiotherapy. S.L.

N82-29888# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE CERVICAL COLUMN OF PILOTS OF COMBAT AIRCRAFT
R. P. Delahaye and R. Auffret *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 261-263 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The pilots of high performance fighter aircraft sometimes complain of cervical pain during flight at low altitude. The level of vibrations is especially high and the pilot is often leaning forward in a fixed position. The character of the workload, notably in high performance combat aircraft (Mach 2) is considered in studying this problem. S.L.

N82-29889# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE SPINE AND FITNESS FOR FLIGHT
R. P. Delahaye, R. Auffret, G. Leguay, P. Doury, P. J. Metges, and C. Kleitz *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 264-289 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The harmful effects of flight factors studied, and the analysis of different sets of statistics confirm that the vertebral column is subjected to a certain number of more or less severe stresses in the course of a flying career. It is necessary to define some criteria of fitness, as far as the spine is concerned, in relation to the type of aircraft. These conditions for fitness are considered from two very distinct aspects: fitness at the time of admission of flying personnel, and fitness upon reexamination and after air accidents. S.L.

N82-29890# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
VERTEBRAL ARTHRITIS
In its Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 290-295 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Vertebral arthritis is a commonly encountered disorder that rarely affects the fitness of flying personnel. Factors that are considered are the roles in which the flying duties impose a stress upon the spine; these mainly comprise helicopter and combat pilots. The painful functional disturbance unrelated to radiological signs, radiogically, severe involvement of the discs, and therapeutic considerations, which under favorable conditions do not exclude surgery are also emphasized. S.L.

N82-29891# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
ANKYLOSING SPONDYLITIS
In its Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 296-300 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

The question of fitness of aircraft pilots in relation to the onset of ankylosing spondylitis is discussed. The clinical form of the disease and the nature of its course are considered. Factors emphasized are: specific roles, such as helicopters or combat aircraft, fixed rigidity of the spine and, even more, deformity, extraspinal involvement, severe inflammatory syndromes, the prospect of rapid development, the recognition of a specific aetiology, and the requirements of treatment. S.L.

N82-29892# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
MEDICO-LEGAL ASPECT OF SPINAL DISORDERS IN AVIATION MEDICINE
P. Doury, R. Auffret, and R. P. Delahaye *In its* Physiopathol. and Pathol. of Spinal Injuries in Aerospace Med. Feb. 1982 p 301-307 (For primary document see N82-29870 20-52)
Avail: NTIS HC A15/MF A01

Medico-legal aspects of spinal disorders in aviation medicine are discussed. Trauma and intervertebral arthritis, trauma and inflammatory rheumatic conditions, and spondylolisthesis and its association with trauma are considered. S.L.

N82-29856# Joint Publications Research Service, Arlington, Va.
CYTOGENETIC ANALYSIS OF PERIPHERAL BLOOD LYMPHOCYTES OF INDIVIDUALS EXPOSED TO LOW DOSES OF IONIZING RADIATION
S. P. Petrova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 17 (JPRS-81419) 2 Aug. 1982 p 80-84 refs Transl. into ENGLISH from Med. Radiol. (USSR), v. 27, no. 3, Mar. 1982 p 70-72 (For primary document see N82-29853 20-51)
Avail: NTIS HC A06/MF A01

N82-29859# Joint Publications Research Service, Arlington, Va.
ELECTROMETRIC INVESTIGATION OF HUMAN GUSTATORY ANALYZER UNDER NORMAL CONDITIONS AND IN SIMULATED WEIGHTLESSNESS
I. Ya. Yakovleva *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-81428) 3 Aug. 1982 p 73-76 refs Transl. into ENGLISH from Otorinolaringol. (USSR), no. 2, Mar. - Apr. 1982 p 15-17 (For primary document see N82-29857 20-51)
Avail: Issuing Activity

N82-29860# Joint Publications Research Service, Arlington, Va.
SIGNIFICANCE OF MINUTE VOLUME PARAMETERS TO EVALUATION OF VESTIBULAR STABILITY
A. S. Gusarov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-18428) 3 Aug. 1982 p 88-91 Transl. into ENGLISH from Voyenno-Med. Zh. (USSR), no. 8, Aug. 1981 p 48-50 (For primary document see N82-29857 20-51)
Avail: Issuing Activity

N82-29861# Joint Publications Research Service, Arlington, Va.
PHASE ANALYSIS OF DYNAMICS OF GALVANIC SKIN RESPONSES IN MAN
A. A. Krauklis, A. A. Aldersons, and I. A. Spandega *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 18 (JPRS-81428) 3 Aug. 1982 p 92-95 refs Transl. into ENGLISH from Iz. Akad. Nauk Latv. SSR (USSR), no. 2, Feb. 1981 p 123-125 (For primary document see N82-29857 20-51)
Avail: Issuing Activity

N82-30275# Joint Publications Research Service, Arlington, Va.
MEDICAL-BIOLOGICAL INVESTIGATIONS UNDER SPACE CONDITIONS: PRESENT AND FUTURE SIGNIFICANCE
H. Fritze *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 22-24 Transl. into ENGLISH from Z. Militaermed.

(East Germany), no. 2, Apr. 1981 p 51-52 (For primary document see N82-30269 20-99)
Avail: Issuing activity

N82-30276# Joint Publications Research Service, Arlington, Va.
TWENTY YEARS OF MANNED SPACE FLIGHT FROM THE VIEWPOINT OF SPACE MEDICINE
H. Haase *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 25-43 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2, Apr. 1981 p 52-60 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

N82-30277# Joint Publications Research Service, Arlington, Va.
INITIAL AUDIOMETRIC INVESTIGATIONS IN AN ORBITAL STATION
W. Proehl, R. Mocker, Ya. Yakovleva, I. I. Bryanov, and M. V. Nefedova *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jun. 1982 p 44-49 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2 Apr. 1981 p 60-62 (For primary document see N82-30269 20-99)
Avail: Issuing activity

N82-30278# Joint Publications Research Service, Arlington, Va.
INTRACUTANEOUS PARTIAL OXYGEN PRESSURE (pO2 SUB ic) IN MAN DURING SHORT-TERM SPACE FLIGHTS: RESULTS OF JOINT USSR-GDR SPACE FLIGHT
H. Haase, E. A. Kovalenko, A. Vacek, M. P. Bobrovnitskiy, B. Jarsumbeck, and V. N. Sementsov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 50-57 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2, Apr. 1981 p 63-65 (For primary document see N82-30269 20-99)
Avail: Issuing activity

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N82-29893# Instructional Science and Development, Inc., San Diego, Calif.
POTENTIAL APPLICATIONS OF COMPUTER-ASSISTED INSTRUCTION TO P-3 AIRCREW TRAINING Final Report, Aug. 1979 - Feb. 1980
Linda J. Mark, William W. Hawkins, and H. Dewey Kribs San Diego, Calif. Navy Personnel Research and Development Center Mar. 1982 43 p
(Contract N66001-79-C-0295)
(AD-A113491; NPRDC-SR-82-18; Rept-14-80-17) Avail: NTIS HC A03/MF A01 CSCL 09/2

An investigation was undertaken to examine the recently revised P-3 aircrew training syllabus at Patrol Squadron 31 to identify the potential contributions that could be made to training effectiveness by a shift to computer-assisted instruction (CAI). Five areas representing the range of potential applications were examined. The characteristics of existing and potential computer-based systems were reviewed, and recommendations for applications to P-3 aircrew training were made.
Author (GRA)

N82-29894# Navy Personnel Research and Development Center, San Diego, Calif.
INSTRUCTOR'S ROLE IN INDIVIDUALIZED TRAINING: A SURVEY OF TWO COMPUTER MANAGED COURSES Final Report, Jul. 1975 - Sep. 1978
Kirk A. Johnson and Linda L. Graham May 1982 46 p
(ZF55522002)
(AD-A114917; NPRDC-TR-82-45; Rept-14-79-4) Avail: NTIS HC A03/MF A01 CSCL 05/9

Detailed records were made of instructor behavior in two Navy courses taught by means of individualized instruction. There were five specialized jobs in one course and six in the other. The jobs within each course differed considerably from one another in (1) the kinds and patterns of activities and (2) the total demands on the instructor. Most of the specialized jobs found in one course had nominal parallels in the other course, but the activities observed in these parallel jobs were frequently quite different.
Author (GRA)

N82-29895# National Academy of Sciences - National Research Council, Washington, D. C. Div. of Health Sciences Policy.
AIRLINE PILOT AGE, HEALTH, AND PERFORMANCE: SCIENTIFIC AND MEDICAL CONSIDERATIONS
National Academy Press Jul. 1981 170 p refs
(Contract N01-AG-0-2112)
(PB82-161506; ISBN-0-309-03176-1; LC-81-82029) Avail: NTIS HC A08/MF A01 CSCL 05I

A comprehensive review is presented of current knowledge about biomedical and behavioral factors that might influence the ability of airline pilots to carry out their job safety as they advance in age.
GRA

N82-29669# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TRAINING OF PERSONNEL SPECIALIZED IN CARTOGRAPHY [AUSBILDUNG VON KARTOGRAPHISCHEM FACHPERSONAL]
Gisela Beer *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 86 1981 p 55-60 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N82-29896*# Southwest Research Inst., San Antonio, Tex.
A FUNCTIONAL VIDEO-BASED ANTHROPOMETRIC MEASURING SYSTEM Final Report
J. H. Nixon and J. P. Cater 28 May 1982 78 p
(Contract NAS9-16158; SwRI Proj. 16-6141)
(NASA-CR-167637; NAS 1.26:167637) Avail: NTIS HC A05/MF A01 CSCL 06B

A high-speed anthropometric three dimensional measurement system using the Selcom Selspot motion tracking instrument for visual data acquisition is discussed. A three-dimensional scanning system was created which collects video, audio, and performance data on a single standard video cassette recorder. Recording rates of 1 megabit per second for periods of up to two hours are possible with the system design. A high-speed off-the-shelf motion analysis system for collecting optical information as used. The video recording adapter (VRA) is interfaced to the Selspot data acquisition system.
Author

N82-29897*# California Univ., Berkeley. Dept. of Mechanical Engineering.
AN APPROACH TO THE PRELIMINARY EVALUATION OF CLOSED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS) SCENARIOS AND CONTROL STRATEGIES
J. D. Stahr, D. M. Auslander, R. C. Spear, and G. E. Young Jul. 1982 46 p refs
(Contract NCC2-67)
(NASA-CR-166368; NAS 1.26:166368) Avail: NTIS HC A03/MF A01 CSCL 06K

Life support systems for manned space missions are discussed. A scenario analysis method was proposed for the initial step of comparing possible partial or total recycle scenarios. The method is discussed in detail.
R.J.F.

N82-29898*# Life Systems, Inc., Cleveland, Ohio.
PREPROTOTYPE INDEPENDENT AIR REVITALIZATION SUBSYSTEM Final Report
F. H. Schubert, Hallick, and R. R. Woods Apr. 1982 92 p refs

(Contract NAS9-15218)
(NASA-CR-167703; NAS 1.26:167703; LSI-TR-319-4) Avail: NTIS HC A05/MF A01 CSCL 06K

The performance and maturity of a preprototype, three-person capacity, automatically controlled and monitored, self-contained independent air revitalization subsystem were evaluated. The subsystem maintains the cabin partial pressure of oxygen at 22 kPa (3.2 psia) and that of carbon dioxide at 400 Pa (3 mm Hg) over a wide range of cabin air relative humidity conditions. Consumption of water vapor by the water vapor electrolysis module also provides partial humidity control of the cabin environment. During operation, the average carbon dioxide removal efficiency at baseline conditions remained constant throughout the test at 84%. The average electrochemical depolarized concentrator cell voltage at the end of the parametric/endurance test was 0.41 V, representing a very slowly decreasing average cell voltage. The average water vapor electrolysis cell voltage increased only at a rate of 20 mu/h from the initial level of 1.67 V to the final level of 1.69 V at conclusion of the testing. A.R.H.

N82-29899*# National Bureau of Standards, Washington, D.C. Industrial Systems Div.
AN OVERVIEW OF EXPERT SYSTEMS
William B. Gevarter May 1982 73 p Sponsored by NASA
(NASA-CR-169197; NAS 1.26:169197; NBSIR-82-2505) Avail: NTIS HC A04/MF A01 CSCL 05H

An expert system is defined and its basic structure is discussed. The knowledge base, the inference engine, and uses of expert systems are discussed. Architecture is considered, including choice of solution direction, reasoning in the presence of uncertainty, searching small and large search spaces, handling large search spaces by transforming them and by developing alternative or additional spaces, and dealing with time. Existing expert systems are reviewed. Tools for building such systems, construction, and knowledge acquisition and learning are discussed. Centers of research and funding sources are listed. The state-of-the-art, current problems, required research, and future trends are summarized. N.W.

N82-29900*# Air Force Flight Test Center, Edwards AFB, Calif.
QUANTIFICATION OF PILOT WORKLOAD VIA INSTRUMENT SCAN
J. R. Tole (MIT), A. T. Stephens (Worcester Polytechnic Inst.), R. L. Harris (Boeing Co., Renton, Wash.), and A. Ephrath (Bell Telephone Labs., Inc., Piscataway, N.Y.) 21 Jan. 1982 17 p refs Presented at and AIAA Workshop on Flight Testing to Identify Pilot Workload and Pilot Dyn., Edward AFB, Calif., 19-21 Jan. 1982
(Contracts NcC1-23; NcC1-56)
(NASA-CR-169238; NAS 1.26:169238) Avail: NTIS HC A02/MF A01 CSCL 05H

The use of visual scanning behavior as an indicator of pilot workload is described. The relationship between level of performance on a constant piloting task under simulated IFR conditions, the skill of the pilot the level of mental workload induced by an additional verbal task imposed on the basic control task, and visual scanning behavior is investigated. An increase in fixation dwell times, especially on the primary instrument with increased mental loading is indicated. Skilled subjects 'stared' less under increased loading than did novice pilots. Sequences of instrument fixations were also examined. The percentage occurrence of the subject's most used sequences decreased with increased task difficulty for novice subjects but not for highly skilled subjects. Entropy rate (bits/sec) of the sequence of fixations was also used to quantify the scan pattern. It consistently decreased for most subjects as the four loading levels used increased. S.L.

N82-29901# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
WORKSHOP ON THE DESIGN AND CONTROL OF DEXTEROUS HANDS
John M. Hollerbach Apr. 1982 22 p refs Workshop held at Cambridge, Mass., 5-6 Nov. 1981
(Contract N00014-81-K-0494)
(AD-A114973; AI-M-661) Avail: NTIS HC A02/MF A01 CSCL 06/4

The workshop for the Design and Control of Dexterous Hands was held at the MIT Artificial Intelligence Laboratory on November 5-6, 1981. Outside experts were brought together to discuss four topics kinematics of hands, actuation and materials, touch sensing, and control. This report summarizes the discussions of the participants and attempts to identify a consensus on applications, mechanical design and control. Author (GRA)

N82-29902# Virginia Polytechnic Inst. and State Univ., Blacksburg. Lab. of Human Factors.
HUMAN/COMPUTER TRANSACTION TASKS: AN ANNOTATED BIBLIOGRAPHY
John G. Casali May 1982 93 p
(Contract N00123-77-C-1081; ZF55521001)
(AD-A114800; NPRDC-TN-82-14; Rept-17-82-6) Avail: NTIS HC A05/MF A01 CSCL 09/2

An annotated bibliography of references relating to human/computer transactions is provided. Operator-analyst and software programmer roles are represented by the majority of the references. Topics covered include display formatting, error modeling, performance assessment, query languages, keyboard and data entry, data organization, and speech input/output. Author

N82-29903# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
CONTROL OF A DIRECT-DRIVE ARM
Haruhiko Asada, Takeo Kanade, and Ichiro Takeyama 9 Mar. 1982 37 p refs
(Contract N00014-81-K-0503)
(AD-A114969; CMU-RI-TR-82-4) Avail: NTIS HC A03/MF A01 CSCL 13/9

A direct-drive arm is a new mechanical arm in which the shafts of articulated joints are directly coupled to the rotors of high performance torque motors. Since the arm does not contain any gears or transmission mechanisms between the motors and their loads, the drive systems have no backlash, small friction and high mechanical stiffness, all of which are desirable for fast, accurate and versatile robots. This paper presents the characteristic analysis and the design of the control system. GRA

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N82-29904*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
GLOBAL DIFFERENTIAL GEOMETRY: AN INTRODUCTION FOR CONTROL ENGINEERS
B. F. Doolin (Computer Services Corp.) and C. F. Martin (Case Western Reserve Univ.) Jun. 1982 69 p refs
(NASA-RP-1091; NAS 1.61:1091) Avail: NTIS HC A04/MF A01 CSCL 12A

The basic concepts and terminology of modern global differential geometry are discussed as an introduction to the Lie theory of differential equations and to the role of Grassmannians in control systems analysis. To reach these topics, the fundamental notions of manifolds, tangent spaces, vector fields, and Lie algebras are discussed and exemplified. An appendix reviews such concepts needed for vector calculus as open and closed sets, compactness, continuity, and derivative. Although the content is mathematical, this is not a mathematical treatise but rather a

text for engineers to understand geometric and nonlinear control. J.M.S.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

N82-29905*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.
CHIP LEVEL SIMULATION OF FAULT TOLERANT COMPUTERS Status Report, 1 Jun. 1981 - 31 May 1982
J. R. Armstrong 31 May 1982 14 p refs
(Grant NAG1-174)
(NASA-CR-169154; NAS 1.26:169154) Avail: NTIS HC A02/MF A01 CSCL 09B

Chip-level modeling techniques in the evaluation of fault tolerant systems were researched. A fault tolerant computer was modeled. An efficient approach to functional fault simulation was developed. Simulation software was also developed. Author

N82-29906# Los Alamos Scientific Lab., N. Mex.
LOS ALAMOS NATIONAL LABORATORY COMPUTER BENCHMARKING, 1981
J. L. Martin and R. G. Martinez Nov. 1981 26 p refs
(Contract W-7405-eng-36)
(DE82-007031; LA-9104-MS) Avail: NTIS HC A03/MF A01

Compilation and execution speeds and histograms for a representative set of benchmark programs are presented. The results of these performance evaluation tests were obtained on the following computers: Cray-1 and Cray-1S and CDC 7600, 6600, Cyber 73, and Cyber 205. DOE

N82-29907# Federal Compiler Testing Center, Falls Church, Va.
CONVERSION PRODUCTS/AIDS SURVEY, OCTOBER 1981 Final Report
Oct. 1981 214 p refs
(PB82-145459; GSA/FCSC-81/004) Avail: NTIS HC A10/MF A01 CSCL 09B

Computer systems conversion aids, translators, and emulators were surveyed. The survey results and vendor and product information are presented as well as a narrative summary of each product and matrices of the products listed by source and target hardware and language. GRA

N82-29908# Navy Regional Data Automation Center, Washington, D. C.
ASCII COBOL INSTRUMENTATION PACKAGE (CIP) FOR THE UNIVAC 1100 SERIES COMPUTERS, USERS MANUAL
Apr. 1981 44 p
(PB82-138447; NARDAC-91S1009-UM-05; FSWEC-81/0008-1) Avail: NTIS HC A03/MF A01 CSCL 09B

The COBOL Instrumentation Package (CIP) is a UNIVAC 1100 series software package intended to assist the COBOL programmer in optimizing, testing, and debugging his source programs. CIP is essentially a software monitoring tool used to facilitate program optimization. Two additional data processing activities, testing and debugging, can greatly benefit through the use of CIP. Information in this Users Manual corresponds to level 3.7 of the CIP program which signs on as CIP REL 3.7. Effective with this level CIP now supports both ASCII and FIELDATA COBOL programs, and also requires no punch-card estimate on the RUN card. The Manual provides the user's ADP personnel on the information necessary to effectively use the system. GRA

N82-30257*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FIELD REPAIR OF MICROPROCESSOR-BASED EQUIPMENT
A. Burford *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 194-196 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09B

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N82-29909 National Research Council of Canada, Ottawa (Ontario).
PROCEEDINGS: GRAPHICS INTERFACE, 1982
K. B. Evans, ed. and E. M. Kidd, ed. 1982 369 p refs Conf. held in Toronto, 17-21 May 1982; sponsored by National Computer Graphics Association of Canada and Canadian Man-Computer Communications Society
Copyright. Avail: Issuing Activity

Computer graphics, user-computer interface design, and interactive graphics techniques are discussed. For individual titles, see N82-29910 through N82-29957.

N82-29910 Montreal Univ. (Quebec).
COGNITIVE SCHEMATA AND THE DESIGN OF GRAPHICS DISPLAYS
Michael I. Mills *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 3-12 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

The relation of practical image making to some basic concerns of cognitive and perceptual theory is demonstrated. The way properties of cognitive schemata (the flexible composition of schemata during comprehension) can provide understanding of the comprehension of cartoons, caricatures, and pictorial metaphors is discussed. These cognitive issues suggest ways that pictures, including computer mediated images, might be effectively used to solve basic problems of graphic communication: how to show appearance, structure, organization and movement. J.D.

N82-29911 TRW Defense and Space Systems Group, Redondo Beach, Calif.
FLAIR: USER INTERFACE DIALOG DESIGN TOOL
Peter C. S. Wong and Eric R. Reid *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 15-21 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

The FLAIR dialog design tool allows the system designer to prototype a system's man-machine interface. A desired mix of input/output devices ranging from voice to high resolution graphics equipment is available. Users are prompted with a dynamic menu according to a predefined syntax similar to English. Commands are entered by the voice of the designer and entered commands validated by voice pattern recognition and command language gating. System messages are presented via the monitor screen and/or a synthesized voice. Pointing devices are used to locate, place, and/or pick objects from the RAMTEK 25-inch color monitor. The entire setup is hosted on a VAX-11/780. The graphics display is handled by a core standard graphics package. A relational data base management system is integrated into FLAIR in order to manage system and user defined data relationships. The system designer is also able to create command menu hierarchies, allowing the designer to simulate, through client menu item selection, the system control flow. J.D.

N82-29912 Los Alamos Scientific Lab., N. Mex.
SOFTWARE FOR DEVICE INDEPENDENT GRAPHICAL INPUT
Griffith Hamlin *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 23-27 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

A three level model and a graphics software structure based on the SIGGRAPH CORE model developed to make graphical applications independent of the input devices are discussed. The

software structure makes graphical applications independent of the input devices and provides a convenient means for application programmers to specify the user input language for their applications. The software consists of an input handler and a table driven parser. The input handler manages a CORE-like event queue, changing input events into terminal symbols and making their terminal symbols available to the parser in a uniform manner. It also removes most device dependencies. The parser is table driven from a Backus-Naur form (BNF) grammar that specifies the user input language. The lower level grammar rules remove the remaining device dependencies from the input, and the higher level grammar rules specify legal sentences in the user input language. The software is implemented on a table top minicomputer. J.D.

N82-29913 General Electric Co., Schenectady, N. Y.
A GRAPHICS INTERCHANGE PROTOCOL AND FORMAT, INCLUDING SYSTEM TOOLS
Kevin Weiler and Greg Glass *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 29-35 refs Prepared in cooperation with Carnegie-Mellon Univ. (For primary document see N82-29909 20-61)
Avail: Issuing Activity

A flexible interchange format system is staged into two distinct levels. The bottom level, the protocol level, is essentially the underlying language in which the format is written. The top level, the format level, is where the interchange format is actually expressed. The strength of this division is twofold: uniformity of syntax, allowing high level parsing tools to be built; and flexibility of semantics, allowing a format which can evolve along with the user community in the least painful way. Detailed descriptions of the protocol, a typical format, and the system tools expected to be provided with an implementation of the protocol are presented. J.D.

N82-29914 McMaster Univ., Hamilton (Ontario). Unit for Computer Science.
TOWARDS A USER INTERFACE PROTOTYPING SYSTEM
Mark Green *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 37-47 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

A prototype user interface is constructed from a set of building blocks. Each of these building blocks simulates a small part of the user interface. The set of building blocks available to the user interface designer is documented in a building block catalogue. The basic properties of building blocks and how they are connected to form a prototype are discussed along with the format and contents of the building block catalogue. A program, called PROSYS, that can be used in prototype construction is briefly described. Several examples are used to illustrate our approach. Author

N82-29915 British Columbia Univ., Vancouver.
HIERARCHICAL APPROACHES TO HIDDEN SURFACE INTERSECTION TESTING
Norm Dadoun, David G. Kirkpatrick, and John P. Walsh (Barron and Associates Acoustical Consultants Ltd.) *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 49-56 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

An approximating hierarchical representation is presented for performing hidden surface elimination in complex scenes. Methods for constructing and using this hierarchy are discussed. Convex bodies are used as elements in the hierarchy. Recent results from computational geometry are applied to element construction and intersection processing. Author

N82-29916 California Univ., Berkeley. Computer Science Div.
COMPUTATIONAL TECHNIQUES FOR PARAMETRIC CURVES AND SURFACES
Brian A. Barsky and Alain Fournier (Toronto Univ., Ontario) *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 57-71 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

The meanings and uses of parametric curves and surfaces are clarified and how much they have in common behind the diversity of their formulations demonstrated. The motivations, properties and references for the Hermite, Coons, Bezier, B-spline and beta spline curves or surfaces are given. The computation and display methods common in a standard graphics system are discussed (computations of points, geometric transformations, display algorithms). Examples and illustrations are given for the curves and surfaces in their cubic form. J.D.

N82-29917 Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Electrical, Computer, and Systems Engineering.
EFFICIENT POLYHEDRON INTERSECTION AND UNION
William Randolph Franklin *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 73-80 refs (For primary document see N82-29909 20-61)
(Grants NSF ENG-79-08139; NSF ISP-79-20240)
Avail: Issuing Activity

An algorithm which calculates the set theoretic combinations, union, intersection and difference, of two polyhedra is described. The polyhedra are in the Eulerian surface description format, specified by their edges and faces. They can have multiple components and nested holes. This algorithm uses an adaptive grid to handle complex objects with thousands of faces without the overhead of comparing every pair of faces to find which pairs intersect. It produces a list of new faces with tags indicating which of these faces are included in each of the set combinations, so that all the combinations of two polyhedra are produced at once with no extra cost. E.A.K.

N82-29918 Concordia Univ., Montreal (Quebec). Dept. of Computer Science.
COMPUTER RECOGNITION OF PLOSIVES IN RUNNING SPEECH
B. Tang and C. Y. Suen *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 81-88 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

A completely automatic speaker independent system to recognize all six stop consonants in continuous speech is proposed. The system uses three different distinctive features including format transitions, silent interval and voice onset time. One hundred and twenty sentences from six English speakers were selected and tested by the system. It is confirmed that no single feature accounts for the distinction of voiced and unvoiced stop consonants. The results of three different distinctive features are compared. E.A.K.

N82-29919 Revenue Canada, Ottawa (Ontario). Computer Systems Directorate.
GRAPHIC DISPLAY OF THE STRUCTURAL COMPOSITION OF CHEMICAL COMPOUNDS
W. M. Verbestel and C. Y. Suen (Concordia Univ.) *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 97-102 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

A computer program for the regeneration of organic chemical structures derived from the Wiswesser notation is discussed. The computer program displays the structure of a chemical compound in graphical form, as the end point of a chemical information system which is essential for acceptable mechanization. In practice, any system proposed for Data Processing will be incomplete without this facility, and the quality of the output must be consistent with the state of the art in this area. E.A.K.

N82-29920 Exxon Corp., Florham Park, N.J.
SSA/AIDS: A GRAPHIC, INTERACTIVE SYSTEM FOR STRUCTURED SYSTEMS ANALYSIS
Richard D. Hoffman, Linda N. Harris, and Brett W. Bickham *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 107-114 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

Computer application requirements collection and analysis by structured systems analysis (SSA) through a methodology which emphasizes the modeling of systems via a series of diagrams is discussed. A tool, SSA/AIDS, which provides computer based support for SSA via an electronic drawing board is examined.

The applications development life cycle in general, and history with methodologies and tools which support this life cycle is described. A specific task in the cycle requirements collection, and SSA as a methodology for accomplishing this task are presented. It is shown how SSA is supported by SSA/AIDS, and plans to extend SSA/AIDS to support the entire applications development life cycle are also discussed. E.A.K.

N82-29921 Integrated Software Systems Corp., San Diego, Calif.

THE GRAPHICS SOFTWARE FAMILY

Mark G. Rawlins *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 115-118 (For primary document see N82-29909 20-61)

Avail: Issuing Activity

A family of graphics software products is examined. Graphics is widely accepted as a valuable tool for transforming data into information. Computer graphics is the medium for producing charts quickly, economically and accurately without sacrificing aesthetic quality. Data processing system are dependent on computer graphics. Family members have common lineage but unique personalities. A family of software packages developed by a single source has built in consistency at the system end and versatility at the user end. E.A.K.

N82-29922 McGill Univ., Montreal (Quebec). Lab. of Computer Vision and Graphics.

GLOBAL ANALYSIS AND DESCRIPTION OF THE OBSERVABLE CHANGES OF A MOVING CELL

Martin D. Levine and Youssry M. Youssef *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 119-120 (For primary document see N8' 29909 20-61)

Avail: Issuing Activity

The development of an image interpretation system capable of analyzing a sequence of pictures to provide a description of the structural changes in the shape of a moving cell was studied. The computer program has to segment the moving cell, and to detect the significant changes in its location, shape, and structure which involves three major areas of image processing: (1) automatic processing of microcopic images; (2) dynamic scene analysis; and (3) shape analysis and description. A theoretical model for a general dynamic scene analysis was constructed. The model consists of three basic enetities: dynamic data, which change continuously during analysis; static data, which remain unchanged; and a collection of analysis processors, each of which is assigned to a particular task. A rule based image interpretation system for moving cells is implemented. The system consists of different cooperating computational processors. The nature and distribution of receptors on or within the membrane, is revealed and the computer study may lead to better understanding of the cell membrane role in the regulating mechanisms of social behavior of cells. E.A.K.

N82-29923 National Research Council of Canada, Ottawa (Ontario).

GLOBAL LOCOMOTION ANALYSIS AND DESCRIPTION

In its Proc.: Graphics Interface, 1982 1982 p 121-122 (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The locomotion analysis of a neutrophile is described. The cell motion was recorded in real time on 16 mm cine film at rate of two frames per second. The cell was in the presence of bacteria which is located in the south-westerly direction of the original location of the cell. The total observation time was 225 second. The cell locomotionof 125.0 seconds is described. It is concluded that the cell has an average positive chemotaxis motion. E.A.K.

N82-29924 University of Western Ontario, London. Dept. of Computer Science.

LINEAR QUAD- AND OCT-TREES: THEIR USE IN GENERATING SIMPLE ALGORITHMS FOR IMAGE PROCESSING

Irene Gargantini and Zale Tabakman *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 123-127 refs Sponsored by Natural Sciences and Engineering Research Council (For primary document see N82-29909 20-61)

Avail: Issuing Activity

A linear quadtree (oct-tree) an efficient data structure used to represent all relevant properties of a quadtree (oct-tree) is described. It basically consists of a sorted array of quaternary (octal) integers, where each integer corresponds to a black node in the quadtree (oct-tree) representation, and each digit corresponds to a quadrant subdivision. Linear quadtrees (oct-trees) are extremely efficient structures from the point of view of space requirements, saving from 75% up to 98% of the memory locations required by the regular quadtrees (oct-trees). In the algorithms so far implemented using linear quadtrees (oct-trees) are discussed and their worst-case complexities are displayed. E.A.K.

N82-29925 National Research Council of Canada, Ottawa (Ontario).

CURVES FOR MODELLING CHROMOSOME SHAPES

C. M. Merritt *In its* Proc.: Graphics Interface, 1982 1982 p 129-130 (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The results from a number of different types of smooth curves for modelling the backbones of chromosomes which is an important step in image analysis of chromosomes are summarzied. It is found that only the cubic spline curve provides adequate flexibility while retaining smoothness. E.A.K.

N82-29926 Bezier (P. E.), Paris (France).

A COMPUTER AIDED SYSTEM FOR CAR BODY DESIGN

P. E. Bezier *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 131-135 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The use of a computer aided design system to manufacture the tooling for car body production is described emphasizing the requirements and form of structural design information. The numerical process can be aimed at translating, as faithfully as possible, a refined version of a hand made 'clay model', produced by stylists and plasterers. Another solution is to rely on the styling or drawing offices to provide data describing completely with figures the shape of the body, including inner panels. M.G.

N82-29927 National Research Council of Canada, Ottawa (Ontario).

SEMI-ALGORITHMIC SYSTEM FOR DEFINING FREE-FORM CURVES AND SURFACES: APPENDIX 1

In National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 136-152 (For primary document see N82-29909 20-61)

Avail: Issuing Activity

An algorithm defining piecewise curves and surfaces made of segments or patches connecting points previously located in space is described. Theoretically, these segments or patches blend up to any order. The solution is expressed in such a way that an operator can modify it at will till he/she obtains a convenient shape (slope, curvature, twist, etc.) in case it is not correctly represented by the predefined points. M.G.

N82-29928 Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Reaktorentwicklung.

GRIMBI: A COMBINATION OF INTERACTIVE GRAPHICS METHODS AND CAD DATABASE TECHNIQUES FOR FUNCTIONAL MODELLING

K. Leinemann *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 153-160 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The CAD-system GRIMBI is described which serves for synthesizing information structures under functional aspects. It supports manipulation of informations usually represented as blockdiagrams and tables. This CAD-system, therefore, is an aid in the early design phases. It combines interactive graphics methods with database technology for building up information structueres, which represent functional aspects of an object or a system. The GRIMBI system includes a specialized data definition facility to define logical model classes and to describe the external graphic data representation. Modelling according to a model class is done by standard operations, completed by working methods like stepwise refinement/abstraction and management of design alternatives. The operations are supported by an autonomous

command/menue language and by a DML, which is an extension of PL/1. It provides a separation of tasks between a mainframe (for data base management and analysis) and a satellite (for the interactive communication and the graphics subtasks). The GRIMBI system is implemented as a subsystem of REGENT, a CAD kernel system. M.G.

N82-29929 Saskatchewan Univ., Saskatoon.
A LOW-COST SYSTEM FOR MANUFACTURED HOUSING
Cyril M. Coupal *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 161-168 (For primary document see N82-29909 20-61)
Avail: Issuing Activity

A low cost CAD system is described which is designed to assist the architectural planner in the preparation and verification of detailed factory-process specifications, in the form of drawings and printed listings. The system successfully increased the production of these specifications by a actor of four, while reducing the introduction of human error to almost nil. M.G.

N82-29930 Concordia Univ., Montreal (Quebec). Computer Aided Building Design Lab.
THE COMPUTER SIMULATION OF META STRUCTURES
Donald W. Collins *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 173-185 refs Sponsored by Natural Science and Engineering Research Council of Canada (For primary document see N82-29909 20-61)
Avail: Issuing Activity

A dynamic prediction system for space oriented architecture in meta structures using interactive computer graphics techniques is discussed. Meta structures in architecture are variable, space-enclosing, support systems that allow maximum dimensional changes with minimum effort and/or adjustment. The development of a computing model which allows the user to interactively define a meta structure via linguistic and analog control and to simulate the real time motion of structures that are considered to be part of the indeterminate set is described. The user may deploy a designed structure in real time observing the transformations on the Vector General 3DR graphics display which is controlled by a PDP11/45 using the GRASS language. The specific application of the system is the design of large erectable space structures. M.G.

N82-29931 Hitachi Ltd., Tokyo (Japan). Central Research Lab.
MDM-I: A COMPUTER AIDED MOLD DESIGN AND MANUFACTURING SYSTEM
Akio Yajima, Hirofumi Jonishi, Junji Tsuda, and Noria Osada (Hitachi Ltd., Yokohama) *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 187-193 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

A CAD/CAM system used in the design and manufacture of injection molds or plastic parts of electrical consumer appliances, such as vacuum-cleaner bodies or TV-set cabinets is described. A number of techniques for repreenting curved shapes, describing surface shapes, and cutting a set of three dimensional sculptured surfaces using a three axis numerically controlled (NC) milling machines are discussed. Features of this system include: (1) surface representation technique; (2) data input based on design drawings; (3) structured programming capabilities of the shape description language to describe objects; (4) NC-type generation features with cutter interference check capabilities which are applicable to not only flat surfaces but also extremely curved surfaces; and (5) ease-of-use and faster turnaround by sharing functions between a large scale computer and a distributed graphics system. The system was implemented on a HITAC M-200H large scale computer and a HITAC G-730 distributed graphics system. M.G.

N82-29932 Ohio State Univ., Columbus. Computer Graphics Research Group.
AN ADVANCED DATA GENERATION SYSTEM FOR USE IN COMPLEX OBJECT SYNTHESIS FOR COMPUTER DISPLAY
Wayne E. Carlson *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 197-204 refs (For primary document see N82-29909 20-61)
(Grant NSF MCS-79-23670)
Avail: Issuing Activity

An integrated system for the creation and modification of three dimensional data for use in image synthesis is described. The hierarchical organization of the system functions is shown, and several of these functions are detailed. The system is designed so that a user can create a large class of three dimensional objects in an intuitive fashion without an extensive knowledge of the internal workings of the software and the associated data structure. M.G.

N82-29933 Ohio State Univ., Columbus. Computer Graphics Research Group.
REPRESENTATION OF COMPLEX ANIMATED FIGURES
David Zeltzer *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 205-211 refs (For primary document see N82-29909 20-61)
(Grant NSF MCS-79-23670)
Avail: Issuing Activity

A method for representing articulated figures as skeletons, for use with a skeleton animation system under development is described. The implementation includes a translator for mapping structured descriptions of skeletons into an internal representation, movement processor which accepts input from movement scripts or motor control programs, and a graphical processor which allows debugging, display, and real time playback of motion sequences. Output from the graphics processor can be interfaced to a variety of display algorithms so that 3-dimensional shaded and anti-aliased animation can be produced using data generated by the skeleton animation system. M.G.

N82-29934 Waterloo Univ. (Ontario). Computer Graphics Lab.
TECHNIQUES FOR FRAME BUFFER ANIMATION
Kellogg S. Booth and Stephen A. MacKay *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 312-320 refs Sponsored by Natural Science and Engineering Research Council of Canada (For primary document see N82-29909 20-61)
Avail: Issuing Activity

Hardware features widely available on current frame buffer systems offer a surprising variety of techniques for limited animation. Properly used, they provide the illusion of real-time animation for a large class of practical applications. As hardware prices continue to drop, these same features may be available on low-cost raster display terminals. Color lookup tables, zoom-pan-scroll registers, selective memory write, and crossbar switching on data paths all invite imaginative solutions to problems of limited computation and transmission. Used singly or in combination they have important implications for videotex systems such as Telidon. These techniques are examined and some suggestions for future hardware are made. A.R.H.

N82-29935 Bell Telephone Labs., Inc., Murray Hill, N. J.
AN OBJECT EDITOR FOR A REAL TIME ANIMATION PROCESSOR
S. P. Ressler *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 221-225 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

The object editor permits the use of the real time capabilities of an animation processor to create and/or modify graphic objects. These objects can subsequently be used in other application programs. The editor enables the user to change the definition of objects, which are being processed and displayed by the animation processor, in an interactive manner. A 'rubber solid', which is completely manipulable is presented. The user is also given the option of displaying duplicate objects, thus enabling two independent views of the current object. Objects, or pieces thereof, which appear to be quite solid can be stretched and/or squashed in real time. The animation processor does hidden surface calculations in real time while the object editor modifies the description of the object, resulting in a dynamically changing image. This editor is not meant to be a production line system for interactive object design, rather it is research tool for exploring the possibilities of interactive object manipulation. Author

N82-29936 Simon Fraser Univ., Burnaby (British Columbia). Dept. of Kinesiology and Computing Science.
THE SIMULATION OF HUMAN MOVEMENT
T. W. Calvert, J. Chapman, and A. Patla *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 227-234 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

The simulation of human movement is a challenging intellectual and computational problem. The general approaches to simulation and animation of human movement are reviewed in terms of the necessary input environment, simulation model and output environment. Although both dynamic and kinematic systems are discussed, emphasis is on the kinematic and the system developed at Simon Fraser University (SFU) is described to illustrate the trade-offs which are necessary. The SFU system accepts either analytic inputs from a combination of movement notation and movement macros or descriptive kinematic inputs from instrumentation such as goniometers. This leads to a complete kinematic simulation and produces animated output in the form of stick or fleshed out figures on vector or raster graphic displays. Author

N82-29937 Air Force Human Resources Lab., Brooks AFB, Tex.
DEVELOPMENT OF LOW-COST 3-DIMENSIONAL COMPUTER GRAPHICS TRAINING SYSTEM
Lawrence S. Finegold and Anthony J. Asch (Anthony J. Asch, Inc.) *In* National Research Council of Canada Proc.: Graphics Interfaces, 1982 1982 p 235-241 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

An experimental simulation training system was developed using the latest microcomputer hardware and firmware technology combined with a 3-dimensional graphics software program. The purpose of this system is to provide a realistic representation of the 3-dimensional geometry involved in aircraft intercept missions for Air Force weapons directors. The advantages of this system are its relatively low cost, small size, and ability to be used as a stand-alone, interactive, high performance 3-dimensional computer graphics training device. Training and human factors issues are addressed, along with a presentation of the visual display and control capabilities of this experimental system. In addition, guidelines for use in similar programs are offered, along with recommendations for future research. Author

N82-29938 Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
SPATIAL INFORMATION MANAGEMENT: A SURVEY
Martin Tuori *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 243-250 refs (For primary document see N82-29909 20-61)
(DCIEM-RP-82-P-09) Avail: Issuing Activity

Research in spatial information management is reviewed from a variety of application areas, including geographic systems, computer aided design and manufacturing, image processing, graphical interfaces to data base management systems, and general techniques for the representation of spatial information. Significant issues are outlined, and areas suggested for further research. Author

N82-29939 Collins and Moon Ltd., Guelph (Ontario).
MICROCOMPUTER BASED SPATIAL INFORMATION SYSTEM
George Moon and Tim Lehan *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 251-254 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

Spatial information systems consists of not only graphical capabilities, but also data analysis capability. Most systems dealing with spatial information concentrate on producing good quality hard copy output. In many instances, the hard copy is secondary to information content of the data. The hardware cost of providing high quality or cartographic quality for mapping purposes, graphics is high, thereby limiting the number of potential users of spatial information systems. The efforts of providing a low cost, microcomputer based spatial information system are described. Author

N82-29940 National Research Council of Canada, Ottawa (Ontario).
SOME PROBLEMS ASSOCIATED WITH THE USE OF COLOR IN CARTOGRAPHIC DISPLAYS
Michael W. Dobson (SPAD Systems, Ltd.) *In its* Proc.: Graphics Interface, 1982 1982 p 255-259 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

Spurred on by the relatively recent advances in raster technology, cartography plunged into the world of color ggraphics. Although cartographers have been involved in color production for centuries this recent digital innovation allows color to be used freely in an enviroment that lacks the restriction generated by the time and expense of manual color preparation, color proofing and color printing. Unfortunately, the advances in technology surpass the available theory relating to the effective utilization of color in cartographic displays. In an attempt to provide some insights towards a utilization approach to color mapping, several models are described that illustrate the human factors considerations in the communication of cartographic messages. From these models notions of an effective color theory are developed and illustrated by examples of color choropleth maps produced with the Decision Information Display System. Author

N82-29941 Illinois Univ., Chicago.
AUTOMTED POLYGON CREATION FROM DIME NETWORK FILES
Jean-Margret Hynes *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 261-266 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

Available cartographic software for the display of geographically associated information requires that maps be viewed as a series of connected polygons which are expedient for the display of data collected or aggregated by geographic unit. The DIME Census Bureau program to store base map representations of urban areas in machine readable formats is organized as a series of arcs and nodes. This network structure is conductive to geocoding address specific data to allow the aggregtion of such data to geographic units. An algorithm based on existing network theory is suggested to efficiently create polygon boundaries for geographic units from a large set of arcs and nodes. The agorithm enables base map conversion from linear segments to areal units thus allowing a single cartographic information base from which particular areal units can be generated as needed. The algorithm isolates boundary segments in the network and arranges them in continuous plottable boundaries. A.R.H.

N82-29942 Collins and Moon Ltd., Guelph (Ontario).
RESEARCH INTO AN INTERACTIVE SPATIAL INFORMATION SYSTEM
Greg Blair *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 267-270 refs (For primary document see N82-29909 20-61)
Avail: Issuing Activity

Data base research continues on the design and implementation of a spatial information system. The data base research consists of extending existing data base technology to handle spatial and semantic information simultaneously. The data base design supports interactive insertion and extraction of spatial and semantic information. Progress to date in this research is described. Implementation details on data structures that support generalized resolution storage of spatial data, resolution dependent retrievals, topological relation retrievals and the analysis of topological properties for spatial data are given. B.W.

N82-29943 Computer Corp. of America, Cambridge, Mass.
A GRAPHICS INTERFACE TO LARGE, SHARED DATABASES. A SUMMARY PAPER Summary Report
Mark Friedell, Jane Barnett, and David Kramlich *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 271-274 refs (For primary document see N82-29909 20-61)
(Contracts N00039-80-C-040; N00014-81-C-0456)
Avail: Issuing Activity

The technique of spatial data management is reviewed. An

operational prototype system is described that exceeds the capabilities of other spatial data management systems in two ways: (1) the graphical presentation of data is tailored to the user's identity and task, and (2) the system has the capacity for very large, shared databases. These capabilities are possible because the system dynamically generates its graphics environment as the user moves through space, poses new database queries, and changes viewing task. The technique for dynamically generating the graphics environment relies on semantic modeling of the underlying database, modeling of user contexts, and the basic but direct use of knowledge about design layout and the utility of pictures. Current research efforts to extent this knowledge-based approach are discussed. B.W.

N82-29944 Mitre Corp., Bedford, Mass. Intelligence Information Systems Dept.

A VIDEODISC BASED TERRAIN MAP DISPLAY SYSTEM

Richard D. Rhode *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 275-286 refs (For primary document see N82-29909 20-61)

(Contract F19628-81-C-0001)

Avail: Issuing Activity

An interactive map display system using videodisc technology was developed to support applications requiring detailed terrain backgrounds. As a proof of concept, a data base consisting of three thousand color photographs of standard terrain maps was stored on a videodisc. Overlapping maps and multiple scales were included to allow user flexibility in defining an area of interest. Computer generated color graphics are mixed with the output from the videodisc to enable placement of symbology and other dynamic data on the terrain background. Geographic control is provided by a joystick/cursor and function buttons which enable discrete zooming and panning within the data base. Registration of the foreground and background data is controlled automatically by the host processor which is interfaced to both the videodisc and digital graphics generator. B.W.

N82-29945 Massachusetts Univ., Amherst.

ON THE USE OF FRACTALS FOR EFFICIENT MAP GENERATION

F. S. Hill, Jr. and S. E. Walker, Jr. *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 288-289 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

Techniques are described for compressing, storing, and regenerating outline map images in such 'cramped' applications as cockpit instrument-panel splays with on-board microcomputers. a large map database is compacted into a vastly smaller one off-line, and stored on-board (or radioed as needed to the aircraft). During the regeneration process fractal curves are used to flesh out the compressed map outlines into visually compelling maps. Because the compression process retains key information that is later used in the fractalizing phase, an overall dramatic saving is made in dataset size and speed of regeneration. Author

N82-29946 New York Inst. of Tech., Old Westbury. Computer Graphics Lab.

ARTISTIC REFLECTIONS ON MAN-MACHINE INTERFACES

Duane M. Palyka *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 291-293 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The application of computer technology to the solution of artistic problems is discussed. The definition of the concepts of 'mind' and 'self' are given. By the artist becoming the engineer and by the engineer becoming the artist, an integration f the mind can occur that separates the 'self' from the mind and allows the 'self' to use the mind as a tool. It also establishes the computer as another tool one step beyond the tool of the mind. The person, now more integrated, can extend himself more easily through the mind, through the computer, and into the work. B.W.

N82-29947 Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

CONSTRUCTING GRAPHICAL USER INTERFACES BY EXAMPLE

Henry Lieberman *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 295-302 refs (For primary document see N82-29909 20-61)

(Contracts N00014-75-C-522; N00014-80-C-0505)

Avail: Issuing Activity

Tinker, an experimental programming environment for Lisp is described. It makes use of graphics in two novel ways: First, a high resolution display and a mouse allows Tinker to replace most typed commands with menu selection operations, and use multiple windows to display different viewpoints on a developing program simultaneously. Second, Tinker uses an example-oriented approach to programming which is especially suited to writing graphics programs. Tinker allows the implementor to preview the graphic output of a program as the program is being written, by examining example pictures illustrating the effects of each graphics command. As each request for user input is introduced, the implementor supplies example input. Tinker's unique approach to the design of interactive graphical user interfaces is illustrated. B.W.

N82-29948 California Univ., Berkeley. Lawrence Berkeley Lab.

ON THE GRAPHIC DESIGN OF PROGRAM TEXT

Aaron Marcus and Ronald Baecker (Human Computing Resources Corp.) *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 303-311 refs (For primary document see N82-29909 20-61)

(Contract W-7405-eng-48)

Avail: Issuing Activity

With the increasing number of programs of even greater complexity, and with the widespread availability of high resolution raster displays, both soft copy and hard copy, it is essential and possible to enhance significantly the graphic design of program text. Relevant principles from information-oriented graphic design, especially book design are presented. It is shown how a standard C program might be translated into a well-designed typographic version. The great potential for the graphic design of computer programs is demonstrated. B.W.

N82-29949 Waterloo Univ. (Ontario). Computer Graphics Lab.

COLOUR PRINCIPLES AND EXPERIENCE FOR COMPUTER GRAPHICS

Susan M. Goetz, John C. Beatty, and Deryl J. Rasquinha *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 313-322 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The increased availability of colour in raster graphics displays argues a need for greater understanding within the computer graphics community of the physiology and psychophysics of colour. The fundamentals governing colour perception are defined. A program for experimenting with colour as an effective means for vividly experiencing these effects is presented. B.W.

N82-29950 Toronto Univ. (Ontario). Computer Systems Research Group.

AN INFORMAL STUDY OF SELECTION POSITIONING TASKS

William Buxton *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 323-328 refs Sponsored in part by the Social Sciences and Humanities Research Council of Canada and the National Sciences and Engineering Research Council of Canada (For primary document see N82-29909 20-61)

Avail: Issuing Activity

Several techniques for performing selectioning-positioning tasks are compared. The comparison takes the form of a case study where the task is to select from among three geometric shapes and position them in two-space. The study emphasizes how much syntactic, lexical and pragmatic variables can influence the relative ease with which a particular task can be performed. In addition, it is shown how each approach has properties which make it optimal in some contexts. The overall impact of the study is to demonstrate the importance of actually implementing toy systems to test ideas and to point out the shortcomings of pencil and paper exercises. Author

N82-29951 Polhemus Navigation Sciences, Inc., Burlington, Vt.

COMMUNICATING WITH COMPUTERS IN HUMAN TERMS

George Board and Jack Scully - *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 329-335 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The development of SPASYN, a magnetic position and orientation sensing technology is discussed along with the notion that the human body can be used to control sophisticated computer processes. Body language is considered as another way of interacting with computers. The SPASYN concept and its capabilities for interfacing with human motion are described, as well as several applications. R.J.F.

N82-29952 Carleton Univ., Ottawa (Ontario). Dept. of Psychology.

EVALUATION OF GRAPHICS ON VIDEOTEX BY INEXPERIENCED USERS

Jo W. Tombaugh, Richard F. Dillon, and Nancy L. Carboni *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 339-344 ref (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The reaction of inexperienced Telidon users to various graphics currently available on a videotex system is assessed. After becoming familiar with Telidon, the users were asked to rate 32 graphics and to indicate the graphic features which affected their ratings. By examining these ratings and the characteristics of the graphic, it was concluded that user ratings can be used to identify graphics that are considered to be particularly poor and particularly good. In addition, a major determinant of user ratings was the role of the graphic relative to the text. Graphics which illustrated and explained the text were rated more highly than those which served only as decoration. R.J.F.

N82-29953 McMaster Univ., Hamilton (Ontario). Unit for Computer Science.

THE USE OF OBJECT ORIENTED LANGUAGES IN GRAPHICS PROGRAMMING

Mark Green and Paul Philp *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 345-353 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The application of object oriented languages to the construction of graphics program is discussed. It is suggested that this type of language is superior to more traditional languages when it comes to the production of highly interactive graphics programs. A brief description of EDL and an outline of the implementation of it are given. Language features that support graphical input and output are discussed. The use of EDL in the construction of user interfaces, and several applications of EDL are presented. R.J.F.

N82-29954 Tektronix, Inc., Beaverton, Oreg. Computer Research Lab.

A HIGH-PERFORMANCE RASTER DISPLAY SYSTEM

Robert Bates, Jay Beck, Terry Laskodi, Ed Reuss, Marc Wells, John C. Beatty (Waterloo Univ.), Kellogg S. Booth (Waterloo Univ.), and Larry Matthies (Waterloo Univ.) *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 355-364 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

The Geometry Processor is a high speed, programmable, floating point peripheral processor designed to rapidly perform the computations commonly needed for graphics applications. Its firmware is written in a high-level, machine oriented assembly language. A prototypical host software package, based on the GSPC CORE Standard, was developed. The architecture and programming of the procesor is discussed. R.J.F.

N82-29955 Massachusetts Inst. of Tech., Cambridge. Architecture Machine Group.

DYNAMICALLY ALTERABLE VIDEODISC DISPLAYS

David S. Backer and Steve Gano *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 365-371 refs (For primary document see N82-29909 20-61)

(Contract N00014-81-K-0436)

Avail: Issuing Activity

The combination of computer graphics and computer controlled videodiscs to create a new training device is discussed. Materials are presented on computer-formatted video pages of high quality text and color images, which may be single illustrations or sync-sound movies. Data is stored on the optical video disc in the forms of pictures, sound, and digitally encoded data; interaction is via a touch sensitive video screen that allows control of page format, level of complexity, style of presentation, and individual annotations. The system is characterized by the qualities usually associated with books, but augmented by the dynamics, sound, and color of the videodisc. The prototype presented is for training in the operation, maintenance, and repair of an automat transmission, though it may serve as a model for other systems. R.J.F.

N82-29956 Texas Univ., Austin.

A VLSI-ORIENTED ARCHITECTURE FOR REAL-TIME RASTER DISPLAY OF SHADED POLYGONS Preliminary Report

Donald Fussell and Bharat Deep Rathi *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 373-, 0 refs (For primary document see N82-29909 20-61)

(Grant NSF MCS-81-09489)

Avail: Issuing Activity

The organization of a large-scale graphics hardware system which can produce color, shaded, anti-aliased, perspective images of complex three-dimensional scenes in real time is discussed. By complex scenes we mean those consisting of at least 25,000 polygons. In contrast, existing high-performance raster systems of this type can handle only 1000 to 4000 polygons. This level of complexity is attainable with reasonable cost and reliability only if large parts of the system can be implemented as custom very large scale integration chips. In particular, it is possible to replace a traditional frame buffer with a device which stores polygons rather than points and performs scanout, shading, and anti-aliasing on them. With the addition of other special-purpose chips which perform transformations, clipping, perspective projection, and lighting calculations, such a polygon buffer forms the core of a parallel, pipelined organization which achieves the desired level of performance. R.J.F.

N82-29957 Innovative Systems Group, Toronto (Ontario).

CONSIDERATIONS IN THE DESIGN OF A LASER GRAPHICS SYSTEM

Ken Deaton *In* National Research Council of Canada Proc.: Graphics Interface, 1982 1982 p 381-386 refs (For primary document see N82-29909 20-61)

Avail: Issuing Activity

Principles of laser operation and scanning techniques are reviewed. The visual qualities of the beam are evaluated and problems in raster scanning and colour mixing are brought out. Non-scan visuals such as interference patterns and holograms are presented as alternative forms of non-electronic image formation and processing which rely on the phase coherence of the laser light. Finally, the highlights of a laser graphics system using a distributed intelligence architecture are outlined for a current design. R.J.F.

N82-29958*# General Research Corp., Santa Barbara, Calif.

AUTOMATED VERIFICATION OF FLIGHT SOFTWARE. USER'S MANUAL

S. H. Saib Apr. 1982 143 p refs

(Contract NAS2-10550)

(NASA-CR-166346; NAS 1.26:166346) Avail: NTIS HC A07/MF A01 CSCL 09B

(Automated Verification of Flight Software), a collection of tools for analyzing source programs written in FORTRAN and AED documented. The quality and the reliability of flight software are improved by: (1) indented listings of source programs, (2) static analysis to detect inconsistencies in the use of variables and parameters, (3) automated documentation, (4) instrumentation of source code, (5) retesting guidance, (6) analysis of assertions, (7) symbolic execution, (8) generation of verification conditions, and (9) simplification of verification conditions. Use of AVFS in the verification of flight software is described. Author

N82-29959*# Texas Instruments, Inc., Dallas. Central Research Labs.

ADVANCED DATA PROCESSING IC DEVELOPMENT Final Report, 29 Aug. 1980 - 31 Dec. 1981
C. Hewes and C. R. Hewes 21 Jan. 1982 78 p refs
(Contract NAS1-16116)
(NASA-CR-165898; NAS 1.26:165898; Rept-08-82-24) Avail: NTIS HC A05/MF A01 CSCL 09B

The state of the art in signal processing through the use of advanced VLSI technology is discussed. Programmability, low power, and very high throughput are included. General purpose programmable signal processing microcomputers with on-board array multipliers, high bandwidth I/O, and considerable on-chip memory are considered. This capability appears to e feasible with the advent of advanced CMOS technology with 1.0 to 1.5 micrometer pattern sizes. A very high performance CMOS 16 x 16 array multiplier/accumulator was designed. The multiplier is capable of operating at a 40 MHz rate when used in a pipeline mode or at a 25 MHz rate in non-pipelined mode.
Author

N82-29960*# Texas Engineering Experiment Station, College Station. Data Processing Center.
THE ANALYSIS OF THE STATISTICAL AND HISTORICAL INFORMATION GATHERED DURING THE DEVELOPMENT OF THE SHUTTLE ORBITER PRIMARY FLIGHT SOFTWARE Final Report
Dick B. Simmons, Miner P. Marchbanks, Jr., and Michael J. Quick Jun. 1982 217 p refs
(Grant NCC9-2)
(NASA-CR-169194; NAS 1.26:169194; RF-82-17) Avail: NTIS HC A10/MF A01 CSCL 09B

The results of an effort to thoroughly and objectively analyze the statistical and historical information gathered during the development of the Shuttle Orbiter Primary Flight Software are given. The particular areas of interest include cost of the software, reliability of the software, requirements for the software and how the requirements changed during development of the system. Data related to the current version of the software system produced some interesting results. Suggestions are made for the saving of additional data which will allow additional investigation. R.J.F.

N82-29961# Electromechanical Systems of New Mexico, Inc., Albuquerque.
EFFECT OF DIGITAL WORD SIZE ON PRECISION OF DATA RECOVERY FROM FIELD INSTRUMENTATION Report, 15 Apr. 1979 - 12 Nov. 1980
T. A. Stough 12 Nov. 1980 56 p
(Contract DNA001-79-C-0298)
(AD-A114081; AD-E300967; ESI-80-001-TR; DNA-5510T) Avail: NTIS HC A04/MF A01 CSCL 09/2

With the onset of new technological advances in microelectronics, it is possible to acquire data in digital form directly in the field as opposed to recording analogue data in the field then in a separate laboratory process convert to digital data. Most of the DNA field event data include responses from accelerometers, pressure gages, velocity gages and stress-strain measurements. The effect of the precision of a digital data acquisition system on the data and the integrals is the subject of this report from the point of view of digital data analysis using various word sizes. GRA

N82-29962# Purdue Univ., Lafayette, Ind. Dept. of Computer Sciences.
CONVERTER FROM DATA-FLOW TO SYNCHRONOUS EXECUTION IN LOOP PROGRAMS Interim Technical Report
Janice E. Cuny and Lawrence Snyder May 1982 27 p refs
(Contracts N00014-80-K-0816; N00014-81-K-0360)
(AD-A114705; CSD-TR-404) Avail: NTIS HC A03/MF A01 CSCL 21/1

We present conversion algorithms that would enable programmers to program in a high-level, data-flow language and then run their programs on a synchronous machine. A model of interprocess communication systems is developed in which both data-flow and synchronous execution modes are represented. For a subclass of parallel programs, called loop programs, we characterize the programs for which conversions are possible in terms of sets of balancing equations. We show that all loop programs having the finite buffer property can be converted into synchronous mode. Finally, two algorithms for the conversion of loop programs are presented and discussed. Author (GRA)

N82-29963# CHI Systems, Inc., Goleta, Calif.
CHI-5 MICRO-PROGRAMMING REFERENCE MANUAL Quarterly Technical Report, 10 Feb. - 10 May 1982
Glen J. Culler May 1982 59 p
(Contract MDA903-82-C-036; ARPA Order 3625)
(AD-A114707) Avail: NTIS HC A04/MF A01 CSCL 09/2

The CHI-5 is a general purpose computer whose inner structure is that of an array processor. This document is a micro-programming reference manual for the CHI-5. It includes descriptions of the major logical modules of the CHI-5, a description of the CHI-5 micro-assembler, and specifications of the assembler syntax for the CHI-5 micro-operations.
Author (GRA)

N82-29964# Illinois Univ., Urbana. Coordinated Science Lab.
UNDERSTANDING AND REPRESENTING NATURAL LANGUAGE MEANING Annual Report, 1 Jan. - 31 Dec. 1981
David L. Waltz May 1982 36 p refs
(Contract N00014-75-C-0612)
(AD-A114568; T-114) Avail: NTIS HC A03/MF A01 CSCL 05/2

Event shape diagrams for events and actions were introduced. Mechanisms for explanatory schema acquisition, a process which allows a program to learn new plans and scripts (i.e., action sequences) by reading articles or stories based on the plans or scripts were developed. Computer programs which can understand complex noun phrases (such as water pump pulley adjustment screw thread damage report summary) were completed. Identifying and cataloging cognitive universals is reported. Author

N82-29965# Hanford Engineering Development Lab., Richland, Wash.
STANDARDS AND GUIDELINES APPLICABLE TO SCIENTIFIC SOFTWARE LIFE CYCLE
N. P. Wilburn 1981 87 p refs Presented at the IEEE Software Standards Workshop
(Contract DE-AC06-76FF-02170)
(DE82-005914; HEDL-SA-2553-FP) Avail: NTIS HC A05/MF A01

A survey of 99 standards and guidelines is given as to their applicability in the development of scientific software. The coverage by the standard or guidelines of the four aspects (performance, documentation, verification, management) of each of the six phases of the software life cycle (requirements, design, implementation, testing, operation, maintenance) is identified.
DOE

N82-29966# Teknologisk Inst., Tastrup (Denmark).
COMPUTER PROGRAM FOR SOLAR HEATING SYSTEM. FOR TI59 PROGRAMMABLE POCKET COMPUTER
Frank Bason and T. Vest Hansen 1980 92 p refs In DANISH
(DE82-900840; NP-2900840) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

The aim of the solar program sponsored by Danish Ministry of Energy is to construct solar heating systems of high efficiency and durability, to make the solar heating prices competitive with other heating sources and to estimate the contribution of solar heating to the total heating needs. A popular evaluation of the existing and planned small-house heating systems is given with regard to insolation, seasonal variations, etc. DOE

N82-29967# Los Alamos Scientific Lab., N. Mex.
USER'S MANUAL FOR PANDA: A COMPUTER CODE FOR CALCULATING EQUATIONS OF STATE
Gerald I. Kerley Nov. 1981 80 p refs
(Contract W-7405-eng-36)
(DE82-010981; LA-8833-M) Avail: NTIS HC A05/MF A01

An interactive computer code that constructs equations of state (EOS) for materials over a wide range of densities and temperatures is described. It provides several options for such contributions to the EOS as the cold curve, lattice vibrations, fluid degrees of freedom, electronic excitations, and intramolecular

vibration and rotation. The user enters parameters that define the EOS and makes calculations to test and study the model. The code generates standard Sesame EOS tables that can be read in to other codes or added to a data library for applications. DOE

N82-29968# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Neutronenphysik und Reaktortechnik.
EVIDENCE OF SIGNIFICANT BIAS IN AN ELEMENTARY RANDOM NUMBER GENERATOR
H. Borgwaldt and V. Brandl Mar. 1981 17 p refs In ENGLISH; GERMAN summary
(DE82-780150; KFK-3107; ISSN-0303-4003) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

An elementary pseudorandom number generator for isotropically distributed unit vectors in 3 dimensional space was tested for bias. This generator uses the IBM-supplied routine RANDU and a transport rejection technique. The tests show clearly that nonrandomness in the pseudorandom numbers generated by the primary IBM generator leads to bias in the order of 1 percent in estimates obtained from the secondary random number generator. FORTRAN listings of 4 variants of the random number generator called by a simple test program and output listings are included for direct reference. DOE

N82-29653# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
PROGRAM DEVELOPMENT FOR THE INTERACTIVE VIDEO SYSTEM CD 400 AT THE BAVARIAN LAND SURVEY OFFICE [PROGRAMMENTWICKLUNG FUER DAS INTERAKTIVE BILDSCHIRMSYSTEM CD 400 AM BAYERISCHEN LANDESVERMESSUNGSAMT]
Bernhard Dresse *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 31-35 In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29657# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A PROGRAM FOR THE AUTOMATIC PLOTTING OF ROAD NETWORKS [EIN PROGRAMM ZUR AUTOMATISCHEN ZEICHNUNG DES STRASSENNETZES]
Hartwig Junius *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 67-72 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29661# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
DIGITAL IMAGE PROCESSING (DIP) AT THE INSTITUTE FOR PHOTOGRAMMETRY AND TOPOGRAPHY, KARLSRUHE UNIVERSITY: CARTOGRAPHIC APPLICATIONS [DIGITALE BILDVERARBEITUNG (DBV) AM INSTITUT FUER PHOTOGRAMMETRIE UND TOPOGRAPHIE (IPT) DER UNIVERSITAET KARLSRUHE - KARTOGRAPHISCHEANWENDUNGEN]
Gerhard Schweinfurth *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 117-135 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29662# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPORT ON AN INDUSTRIAL VISIT TO OFFICES WITH COMPUTER-ASSISTED MAP PRODUCTION IN THE USA [BERICHT UEBER EINE !NFORMATIONSREISE ZU DIENSTSTELLEN MIT AUTOMATIONSGESTUETZTER KARTENHERSTELLUNG IN DEN USA]
Wigand Weber *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 137-162 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-30242*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ALGORITHMS FOR SOFTWARE DEVELOPMENT VERSION CONTROL AND CHANGE DETECTION
R. C. Tausworthe *In its* The Telecommun. and Data Acquisition Rep. 1F Jun. 1982 p 20-35 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09B

N82-30247*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FIELD INTERFACE MODULE SOFTWARE DESCRIPTION
H. Valtier *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 101-106 ref (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

N82-29969*# SRI International Corp., Menlo Park, Calif.
DESIGN STUDY OF SOFTWARE-IMPLEMENTED FAULT-TOLERANCE (SIFT) COMPUTER Final Report
J. H. Wensley, J. Goldberg, M. W. Green, W. H. Kutz, K. N. Lev ' M. E. Mills, R. E. Shostak, P. M. Whiting-OKeefe, and H. M eidler Washington NASA Jun. 1982 246 p refs (Contract NAS1-13792)
(NASA-CR-3011; NAS 1.26:3011) Avail: NTIS HC A11/MF A01 CSCL 09B

Software-implemented fault tolerant (SIFT) computer design for commercial aviation is reported. A SIFT design concept is addressed. Alternate strategies for physical implementation are considered 'ardware and software design correctness is addressed. System modeling and effectiveness evaluation are considered from a fault-tolerant point of view. Author

N82-29970# Oak Ridge National Lab., Tenn. Computer Sciences.
EBT DATA ACQUISITION SYSTEM CONTROL FACILITIES
R. D. Burris Jan. 1982 24 p refs
(Contract W-7405-eng-26)
(DE82-007470; ORNL/CSD/TM-166) Avail: NTIS HC A02/MF A01

A multicomputer, multitask data acquisition and analysis system was implemented for the Elmo bumpy torus (EBT) experiment in controlled fusion. The control of data file names, the maintenance of critical data bases and the control of various tasks are described. DOE

N82-29971# California Univ., Livermore. Lawrence Livermore Lab.
DELTA-T PROTOCOL SPECIFICATION: WORKING DRAFT
R. W. Watson 4 Dec. 1981 82 p refs
(Contract W-7405-eng-48)
(DE82-010601; UCID-19293) Avail: NTIS HC A05/MF A01

Livermore Interactive Network Communication System (LINCS) hierarchical architecture are described. At the heart of LINCS is its basic interprocess communication (LINCS-IPC) service. LINCS-IPC defines a reliable, flow controlled, full duplex, uninterpreted, labeled bit stream communication service. LINCS-IPC is level 4 in the LINCS architecture. Level 3 of LINCS is the Network layer defining an internetwork datagram type service. LINCS-IPC interfaces to processes that utilize higher level syntactic and semantic conventions for process interaction. The transport service provided by the Delta-t augments the Network level service as required to support LINCS-IPC. The services provided by the Delta-t protocol to support LINCS-IPC, the operation of Delta-t, and the services Delta-t requires of the Network level are specified. Implementations are underway in PASCAL for the PDP-11 running under RT11 and RX11, in BLISS for the VAX running under VMS, in MODEL for the CRAY-1 and CDC 7600 running under NLTSS and LISS, and for the SEL 32/75 running under PORT. DOE

N82-29972# California Univ., Livermore. Lawrence Livermore Lab.
DELTAGRAM PROTOCOL SPECIFICATION
R. W. Watson 3 Dec. 1981 23 p refs
(Contract W-7405-eng-48)
(DE82-010599; UCID-19295) Avail: NTIS HC A02/MF A01

The Livermore Interactive Network Communications System (LINCS) is a hierarchical architecture for the support of distributed computing. Level 3 of this architecture is the Network layer defining a diagram network. DeltaGram is the LINCS datagram protocol, with the following caveat. A packet passed to the origin DeltaGram module may be segmented in route and be delivered as two or more packets at the destination. DeltaGram does not provide reassembly at intermediate or destination modules. Another view is that the fields in the original packet are attributes labeling the bits in the packet. Even if the original packet is segmented, the bits are delivered to the destination as originally labeled. Therefore, DeltaGram can be viewed as providing a labeled bit stream service. DeltaGram's purpose is to carry packets on a best effort basis from origin to destination ports. Ports are identified by addresses and are normally bound to processes. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support*.

N82-29973# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
REASONING UTILITY PACKAGE USER'S MANUAL, VERSION ONE
David A. McAllester Apr. 1982 58 p refs
(Contract N00014-75-C-0643; Grant NSF MCS-77-04828)
(AD-A114756; AI-M-667) Avail: NTIS HC A04/MF A01 CSCL 06/4

RUP (Reasoning Utility Package) is a collection of procedures for performing various computations relevant to automated reasoning. RUP contains a truth maintenance system (TMS) which can be used to perform simple propositional deduction (unit clause resolution), to record justifications, to track down underlying assumptions, and to perform incremental modifications when premises are changed. This TMS can be used with an automatic premise controller which automatically retracts 'assumptions' before 'solid facts' when contradictions arise and searches for the most solid proof of an assertion. RUP also contains a procedure for efficiently computing all the relevant consequences of any set of equalities between ground terms. A related utility computes 'substitution simplifications' of terms under an arbitrary set of unquantified equalities and a user defined simplicity order. RUP also contains demon writing macros which allow one to write PLANNER like demons that trigger on various types of events in the data base. Finally there is a utility for reasoning about partial orders and arbitrary transitive relations. In writing all of these utilities an attempt has been made to provide a maximally flexible environment for automated reasoning. Author (GRA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N82-29974*# Pennsylvania Univ., Philadelphia. School of Electrical Engineering.
MEASUREMENT ACCURACIES IN BAND-LIMITED EXTRAPOLATION
H. N. Kritikos Jul. 1982 19 p refs
(Grant NAG5-92)
(NASA-CR-169152; NAS 1.26:169152) Avail: NTIS HC A02/MF A01 CSCL 12A

The problem of numerical instability associated with extrapolation algorithms is addressed. An attempt is made to estimate the bounds for the acceptable errors and to place a ceiling on the measurement accuracy and computational accuracy needed for the extrapolation. It is shown that in band limited (or visible angle limited) extrapolation the larger effective aperture L' that can be realized from a finite aperture L by over sampling is a function of the accuracy of measurements. It is shown that for sampling in the interval L/b< absolute value of x< L, b>1 the signal must be known within an error e sub N given by e sub N squared approximately = 1/4(2kL') cubed (e/8b L/L')(2kL') where L is the physical aperture, L' is the extrapolated aperture, and k = 2pi lambda. M.G.

N82-29975# Pennsylvania State Univ., University Park. Applied Research Lab.
A RAPID AND ACCURATE SOLUTION FOR THE POISSON EQUATION WITH NEUMANN BOUNDARY CONDITONS ON GENERAL DOMAINS
S. Abdallah 17 Dec. 1981 26 p refs
(Contract N00024-79-C-6043)
(AD-A114679; TM-81-249) Avail: NTIS HC A03/MF A01 CSCL 12/1

This memorandum presents a rapid and accurate solution for the Poisson equation with Neumann boundary conditions on general domains. The stream-like function formulation is used to obtain two modified Poisson equations with Dirichlet boundary conditions. The first equation is solved for the flux components of the dependent variable, and are used in calculating Dirichlet boundary conditions for the second Poisson equation. Two integral constraints are to be satisfied in the present formulation. The first constraint is a consequence of Green's first integral theorem and the second constraint is a result of the present analysis. A new procedure is implemented in the boundary conditions to satisfy the second integral constraint. This technique is applied to calculate the static pressure from a Poisson equation with Neumann boundary conditions in the solution of Navier-Stokes equations (velocity pressure formulation). Numerical results for the incompressible viscous flow in a driven cavity are presented and compared with the available numerical results in the literature. Author (GRA)

N82-29976# Wisconsin Univ., Madison. Mathematics Research Center.
THE NUMERICAL SOLUTION OF A CLASS OF CONSTRAINED MINIMIZATION PROBLEMS
Nira Dyn (Tel-Aviv Univ.) and Warren E. Ferguson, Jr. (Southern Methodist Univ., Dallas) Feb. 1982 16 p refs
(Contract DAAG29-80-C-0041)
(AD-A114574; MRC-TSR-2340) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper proves that a large class of iterative schemes can be used to solve a certain constrained minimization problem. The constrained minimization problem considered involves the minimization of a quadratic functional subject to linear equality constraints. Among this class of convergent iterative schemes are generalizations of the relaxed Jacobi, Gauss-Seidel, and symmetric Gauss-Seidel schemes. Author (GRA)

N82-29977# Tennessee Univ., Knoxville. Dept. of Electrical Engineering.
THE REPRESENTATION OF DISCRETE FUNCTIONS BY DECISION TREES Annual Report, 1 Feb. 1981 - 31 Jan. 1982
R. C. Gonzalez, M. G. Thomason, and B. M. E. Moret 28 Feb. 1982 133 p refs
(Contract N00014-78-C-0311)
(AD-A114970; TR-EE/CS-82-20) Avail: NTIS HC A07/MF A01 CSCL 12/1

A decision tree is introduced; it is essentially a sequential evaluation procedure where, at each step, a variable's value is determined and the next action chosen accordingly. The activity of a variable, a new concept that measures the contribution of a variable to the complexity of a function, is defined and its relation to decision trees is described. Based upon these results (which can be generalized to recursive functions and hierarchies of relations), a complexity measure is proposed. The use of that measure and of the concept of activity in testing large systems (where a number of variables may be inaccessible) is then

examined, with particular emphasis on continuous checking of systems in operation. Author

N82-29978# Harvard Univ., Cambridge, Mass. Computation Lab.

PARALLEL INTERPOLATION SEARCH

John H. Reif Mar. 1982 18 p refs

(Contract N00014-80-C-0674; Grant NSF MCS-79-21024)

(AD-A114611; TR-32-81) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper concerns the problem of searching, with p parallel processors, for a given key in a random ordered table of size n. We propose a parallel interpolation algorithm which we show has expected time cost < or equal log(1 + log (n)/log(p) + O(1) and we prove this algorithm has optimal expected time cost within a constant additive term. Author (GRA)

N82-29979# Harvard Univ., Cambridge, Mass. Computation Lab.

THE EXPECTED TIME COMPLEXITY OF PARALLEL GRAPH AND DIAGRAPH ALGORITHMS

John H. Reif and Paul Spirakis Apr. 1982 31 p refs

(Contract N00014-80-C-0674; Grant NSF MCS-79-21024)

(AD-A114875; TR-11-82) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper determines upper bounds on the expected time complexity for a variety of known parallel algorithms for graph problems. For connectivity of both undirected and directed graphs, transitive closure and all pairs minimum cost paths, we prove the expected time is O(loglog n) for a parallel RAM model (RP-RAM) which allows random resolution of write conflicts, and expected time O(log n loglog n) for the P-RAM of (Wyllie, 79), which allows no write conflicts. We show that the expected parallel time for biconnected components and minimum spanning trees is O(loglog n)(2) for the RP-RAM and O(log n. (loglog n) (2)) for the P-RAM. Also we show that the problem of random graph isomorphism has expected parallel time O(loglog n) and O(log n) for the above parallel models, respectively. Our results also improve known upper bounds on the expected space required tor sequential graph algorithms. For example, we show that the problems of finding strong components, transitive closure and minimum cost paths have expected sequential space O(log-loglog n) with n (O)(1) time on a Turing Machine given random graphs as inputs. GRA

N82-29980# Wisconsin Univ., Madison. Mathematics Research Center.

LOCAL DUALITY OF NONLINEAR PROGRAMS Technical Summary Report

O. Fujiwara, S. F. Han, and O. L. Mangasarian Feb. 1982 23 p refs

(Contract DAAG29-80-C-0041; Grants NSF MCS-79-01066; NSF ENG-79-03881)

(AD-A114538; MRC-TSR-2329) Avail: NTIS HC A02/MF A01 CSCL 12/1

It is shown that the second order sufficient (necessary) optimality condition for the dual of a nonlinear program is equivalent to the inverse of the Hessian of the Lagrangian being positive definite (semidefinite) on the normal cone to the local primal constraint surface. This compares with the Hessian itself being positive definite (semidefinite) on the tangent cone on the local primal constraint surface for the corresponding second order condition for the primal problem. We also show that primal second order sufficiency (necessity) and dual second order necessity (sufficiency) is essentially equivalent to the Hessian of the Lagrangian being positive definite. This follows from the following interesting linear algebra result: a necessary and sufficient condition for a nonsingular nxn matrix to be positive definite is that for each or some subspace of r(n), the matrix must be positive definite on the subspace and its inverse be positive semidefinite on the orthogonal complement of the subspace. Author (GRA)

N82-29981# Wisconsin Univ., Madison. Mathematics Research Center.

ITERATIVELY REWEIGHTED LEAST SQUARES: ENCYCLOPEDIA ENTRY

Donald B. Rubin Feb. 1982 11 p refs

(Contract DAAG29-80-C-0041)

(AD-A114534; MRC-TSR-2328) Avail: NTIS HC A02/MF A01 CSCL 12/1

Iteratively Reweighted least Squares (IRLS) is a computationally attractive method for providing estimated regression coefficient that are relatively unaffected by extreme observations. Definitions and statistical justifications are reviewed, and a numerical example and a multivariate extension are included. This article is to be an entry in The Encyclopedia of Statistical Sciences. Author (GRA)

N82-29982# Wisconsin Univ., Madison. Mathematics Research Center.

SOURCE-SOLUTIONS AND ASYMPTOTIC BEHAVIOR IN CONSERVATION LAWS

Tai-Ping Liu and Michel Pierre Jan. 1982 30 p refs

(Contract DAAG29-80-C-0041; Grant NSF MGS-79-27062)

(AD-A114505; MRC-TSR-2318) Avail: NTIS HC A03/MF A01 CSCL 12/1

We study the uniqueness of the solutions to the scalar conversation law when the initial datum is a finite measure. The case of a Dirac mass is particularly emphasized: it is shown how it provides a description of the asymptotic behavior of the solutions initiated by an arbitrary integrable function. This behavior is proved to depend on one parameter in the case when phi is odd while it depends on two when phi is convex. Author (GRA)

N82-29983# California Univ., Livermore. Lawrence Livermore Lab.

EXISTENCE OF A LAST INVARIANT OF CONSERVATIVE MOTION

Laurence S. Hall 13 Jan. 1982 48 p

(Contract W-7405-eng-48)

(DE82-010215; UCID-18980-Rev-1) Avail: NTIS HC A03/MF A01

A general theory of integrable systems in two dimensions is formulated and applied. (The theory also has applications to more dimensions). The constraints are found which admit to general integrability of the orbits for magnetic forces as well as for forces derivable from a potential. When a system admits a given invariant, the invariant is found. A number of examples including known and apparently previously unknown invariants are given. The theory of exact integrals of the motion also can be extended to the derivation of approximate invariants. The general theory admits a variational principle, among other approximation techniques, for the computation of a best approximate invariant. The problem of the genera cubic potential with one symmetric coordinate, V = 1/2 Ax(2) + 1/2 By(2) + Cx(2)y + 1/3 Dy(3) (of which the well-studied Henon-Heiles potential is the special case for A = B and C = -D), is examined in detail. DOE

N82-29984# California Univ., Livermore. Lawrence Livermore Lab.

EQUATIONS, BOUNDARY AND INITIAL CONDITIONS FOR A TWO-DIMENSIONAL CYCLE MODEL

J. A. Viecelli, H. W. Ellsaesser, and J. E. Burt (Illinois Univ., Urbana) 10 Dec. 1981 16 p refs

(Contract W-7405-eng-48)

(DE82-010216; UCID-19279) Avail: NTIS HC A02/MF A01

The equations used in a recent study of ocean carbon transport and CO2 uptake are given in this note. The two dimensional model described has been useful for reconciling estimates of downward eddy mixing rates obtained from GEOSECS radioisotopic measurements with estimates obtained from the natural equilibrium (14)C concentration in deep water. DOE

N82-29985# Illinois Univ., Urbana. Dept. of Computer Science.

SOLVING ORDINARY DIFFERENTIAL EQUATIONS WITH DISCONTINUITIES

C. W. Gear and O. Osterby Sep. 1981 70 p refs

(Contract DE-AS02-76ER-02383)

(DE82-006906; UIUCDCS-R-81-1064; UILU-ENG-81-1724) Avail: NTIS HC A04/MF A01

An algorithm is described that can detect and locate some discontinuities and provide information about their size, order and position. However, the success of the algorithm is strongly

dependent on the location of the discontinuity with respect to the steps that straddle it. The major advantage of the scheme appears to be that a more reliable error estimate can be used when a discontinuity is present so that codes will be more robust. In some cases significant savings may accrue but it appears that a better restarting procedure than the one used will be necessary to realize most of those benefits. DOE

N82-29986# Sandia Labs., Albuquerque, N. Mex.
CODE FOR DINIC'S MAXIMUM FLOW ALGORITHM
Peter S. Slater Nov. 1981 28 p refs
(Contract DE-AC04-75DP-00789)
(DE82-007558; SAND-81-1927) Avail: NTIS HC A03/MF A01

A guide for the users of a subroutine for finding the maximum value of a source to sink flow in a network is presented. The code, MAXFLO, implements a path augmenting flow algorithm with modifications on a basic maximum flow algorithm. DOE

N82-29987# Joint Inst. for Nuclear Research, Dubna (USSR).
NUMERICAL GENERATION OF ORTHONORMAL POLYNOMIALS OF MANY VARIABLES
V. Gadjokov 1981 17 p refs In ENGLISH; RUSSIAN summary
(DE82-700460; JINR-E-11-80-782) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

An algorithm for the numerical generation of many-dimensional polynomials which are orthonormal with arbitrary weights over a finite real discrete point set is described. Orthonormalization of ordinary many-dimensional linearly-independent monomials is achieved by means of recursion analogous to Forsythe three-term recurrence relation in the case of one dimension. Special attention is paid to the hierarchical order of polynomials obtained. The case of two dimensions is implemented in a package of FORTRAN-4 codes. A numerical example which permits analytical check is considered in detail, and two applications to the problem of data fitting by polynomial series are briefly reported. DOE

N82-29988# Argonne National Lab., Ill.
COVARIANCE MATRICES AND APPLICATIONS TO THE FIELD OF NUCLEAR DATA
D. L. Smith Nov. 1981 76 p refs
(Contract W-31-109-eng-38)
(DE82-007201; ANL/NDM-62) Avail: NTIS HC A05/MF A01

A student's introduction to covariance error analysis and least squares evaluation of data is provided. It is shown that the basic formulas used in error propagation can be derived from a consideration of the geometry of curvilinear coordinates. Procedures for deriving covariances for scaler and vector functions of several variables are presented. Proper methods for reporting experimental errors and for deriving covariance matrices from these errors are indicated. The generalized least squares method for evaluating experimental data is described. Finally, the use of least squares techniques in data fitting applicatons is discussed. Specific examples of the various procedures are presented to clarify the concepts. DOE

N82-29989# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
ADVANCES IN THE TECHNIQUES AND TECHNOLOGY OF THE APPLICATION OF NONLINEAR FILTERS AND KALMAN FILTERS
Cornelius T. Leondes, ed. Mar. 1982 531 p refs
(AGARD-AG-256; ISBN-92-835-1418-1) Avail: NTIS HC A23/MF A01

The general theory of filtering is discussed in terms of its historical development. An overview of discrete time and continuous time Kalman filters is presented. Filters in nonlinear dynamic systems are discussed in detail. Various computational techniques in nonlinear and linear filters are presented. Applications and methodologies for nonlinear and Kalman filters are given. Topics covered includes: navigation systems; tracking systems; and target recognition. For individual titles, see N82-29990 through N82-30007.

N82-29990# Bodenseewerk Geraetetechnik G.m.b.H., Ueberlingen (West Germany).
NONLINEAR FILTERING THEORY
Volker Krebs *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 26 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

An introduction to nonlinear filtering theory is presented by means of a deductive approach. The so-called general estimation problem is defined which is concerned with the extraction of useful information from noisy measurements. The exact mathematical solution of the general estimation problem is outlined which yields the Kushner-Stratonovich equation respectively the Bayesian recursive estimator. From these equations the practical nonlinear filter approxmations are derived in a deductive way. Most important are the local approximate filters of first order (type: extended Kalman Filter) and second order filters. In addition, there are global approximate filters (Bayes-law calculators) available. Several approximation methods for these estimators, such as orthogonal series expansion, Gaussian sums, point masses and splines are briefly discussed. B.W.

N82-29991# Defence Research Establishment, Ottawa. (Ontario). Electromagnetic Section.
EXACT AND APPROXIMATE NONLINEAR ESTIMATION TECHNIQUES
D. F. Liang *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filter Mar. 1982 21 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

In the case of continuous systems, filtering algorithms are derived for nonlinear systems without delays, imbedded in white noise, correlated noise and noise free processes. The filtering equations obtained for nonlinear systems with white noise processes are exact, but for non-white noise processes the results obtained are approximate. In the case of discrete-time systems, nonlinear estimation algorithms, that directly yield the fixed-lag, fixed-point and fixed-interval smoothing and the filtering algorithms, are derived for nonlinear delayed systems wtih measurements corrupted by white noise and correlated noise processes. The derivation is straightforward and clearly indicates the close links between three different classification of smoothers and the filtering estimator. For systems with polynomial, product-type or state-dependent sinusoidal nonlinearities, the proposed algorithms can be practically realized without the need of approximation under the assumption that the estimator errors are Gaussian. Such an assumption is significantly different from the most commonly used assumption that the state is Gaussian. Author

N82-29992# Naval Air Development Center, Warminster, Pa.
THE THEORY AND TECHNIQUES OF DISCRETE-TIME DECENTRALIZED FILTERS
Thomas H. Kerr (Intermetrics, Inc.) and Leonard Chin *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 39 p refs (For primary document see N82-29989 20-64)
(Contract N6116972-D-0301)
Avail: NTIS HC A23/MF A01

An overview of the alternative decentralized filtering techniques that have evolved over the last decade and the current status of each approach is presented. This aspect is important as a preliminary step in performing engineering by allowing the selection of the approach that best fits the constraints imposed by the specific application. Several contributions that are provided herein advance the state-of-the-art for two decentralized filtering approaches (viz., SLU and SPA) as formulated here in discrete-time by specifying and summarizing mechanization equations (with rationale), by analytically establishing stability of these estimation algorithms, and by providing tables that allow quantification of the computer burden upon implementation in terms of required memory allotment and algorithm cycle times. Thus a complete veiw of these two approaches to decentralized filtering is provided. Current applications and likely future application areas for decentralized filtering are identified. B.W.

N82-29993# Naval Air Development Center, Warminster, Pa.
ADVANCES IN COMPUTATIONAL EFFICIENCIES OF

LINEAR FILTERING
Leonard Chin *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 29 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

A broad overview of various discrete-time linear filtering techniques including the Square-Root and variations of Square-Root, Factorized, Chandrasekhar, Partitioning and Decentralized algorithms as well as the basic Covariance and Information filters are presented. Computer burdens of these well-known filtering algorithms are examined and compared from practical operation point of view. B.W.

N82-29994# Texas Instruments, Inc., Lewisville.
DESIGN OF REAL-TIME ESTIMATION ALGORITHMS FOR IMPLEMENTATION IN MICROPROCESSOR AND DISTRIBUTED PROCESSOR SYSTEMS
Vytas B. Gylys *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 34 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

The use of multiprogrammed processing as a suitable processing environment for real-time estimators is proposed. Concurrent processing is presented as the basic technique for overcoming the hardware limitations and for meeting the real-time constraints of the estimation problem. Design of a decentralized real-time operating system for controlling multiprogrammed execution of processes in a distributed sytem is outlined. This operating system consists of autonomous, local real-time executives, which operate under fixed allocation of resources. Process scheduling and communications are discussed. The established structure of real-time software and process control can then be utilized to mechanize estimation algorithms as concurrent processes. Several known schemes for decomposing a Kalman filter into concurrent processes are illustrated. B.W.

N82-29995# Hughes Aircraft Co., El Segundo, Calif.
GLOBAL APPROXIMATION FOR NONLINEAR FILTERING WITH APPLICATION TO SPREAD SPECTRUM RANGING
W. Michael Bowles and John A. Cartelli (ESL, Synnyvale, Calif.) *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 30 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

Some global approximation procedures for nonlinear filtering are described. These procedures yield algorithms for recovering a signal from a measurement containing signal plus noise. The celebrated Kalman filter solves problems in which the signal evolves as the solution to a linear differential equation driven by white Gaussian noise with Gaussian initial condition and where the signal enters linearly into a measurement corrupted by white Gaussian noise. For problems where these linear Gaussian conditions are weakly violated, the Kalman filter serves as a good approximation. In many interesting are weakly violated, the Kalman filter serves as a good approximation. In many interesting problems, however, these conditions are not satisfied. For example, one of the random variables may have a multimodal density function or the signal may enter nonlinearly into the measurement. The techniques discussed here give the designer some tools to use when the Kalman filter is no longer a reasonable approximate solution. B.W.

N82-29996# Systems Control, Inc., Palo Alto, Calif.
SYSTEM IDENTIFICATION OF NONLINEAR AERODYNAMIC MODELS
T. L. Trankle, J. H. Vincent, and S. N. Franklin *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 26 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

System identification, a technology for determining a mathematical model of a dynamic system from observations of its response to inputs is discussed. Identification technology is used for the determination of nonlinear aerodynamic models for aircraft maneuvering at high angles of attack. The method outlined here (equation error, output error, and maximum likelihood algorithms) can directly nonlinear aerodynamic coefficients in table look-up or multivariable spline formats. For application to nonlinear problems, the basic algorithms are enhanced by recent techniques for evaluation of partial derivatives of the likelihood function, calculation of parameter estimation uncertainties, and by the use of multidimensional splines as a generic model structure. An example application of these methods to the identification of F-4S fighter aircraft high angle of attack aerodynamics is illustrated. B.W.

N82-29997# Elektronik-System G.m.b.H., Munich (West Germany).
TECHNIQUES AND METHODOLOGIES FOR THE ESTIMATION OF COVARIANCES, POWER SPECTRA AND FILTER-STATE AUGMENTATION
Volkmar Held *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 10 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

A technique for the the estimation of stationary stochastic noise data from real measurements is discussed. This data contains the noise as well as non-observable deterministic values. The separation is accomplished by a specific smoothing procedure. The stochastic behavior of the data is proven by a Gaussian probability distribution test. Then, based on conventional stochastic relations the covariance and the spectral density are evaluated. Shaping filters are determined from the power spectral density to model colored noise. The filter structure is selected and the filter parameters are optimally identified by a least squares procedure. Finally the filter state is augmented by the degree of the shaping filter. B.W.

N82-29998# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Electrical Engineering.
REDUCED ORDER KALMAN FILTER DESIGN AND PERFORMANCE ANALYSIS
Peter S. Maybeck *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 16 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

The design of an effective operational Kalman filter is discussed. The crux of such a design effort is establishing an adequate model upon which to base the filter: a model describing system dynamics, measurement device characteristics, and statistical properties of uncertainties associated with this structure, all of which becomes embodied in the filter algorithm. Using physical insights, order reduction and model simplification techniques, numerous prospective filters are proposed for a given application. A systematic design procedure is described that exploits these stochastic modeling and performance analysis capabilities, and an example is used to emphasize some important aspects of the design approach. B.W.

N82-29999# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Electrical Engineering.
DESIGN AND PERFORMANCE ANALYSIS OF AN ADAPTIVE EXTENDED KALMAN FILTER FOR TARGET IMAGE TRACKING
Peter S. Maybeck *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 15 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

A simple extended Kalman filter is designed to track targets using outputs from a forward-looking infrared sensor as measurements. It exploits knowledge unused by current correlation trackers - size, shape, and motion characteristics of the target, atmospheric jitter spectral description, and background and sensor noise characteristics - to yield enhanced performance. Monte Carlo performance analyses indicate that the ability of a nonadaptive four-state filter to track a realistic distant point source target with an error standard deviation of 0.2 picture elements under expected tracking conditions surpasses the correlation trackers' abilities by an order of magnitude. Although very accurate tracking performance is achieved under nominally assumed conditions, robustness studies portray a significant degradation when the filter's internal model does not denict the target's intensity profile or motion characteristics well. Background noise properties are shown to be of secondary importance at expected signal-to-noise ratios. These studies emphasize the need for good models and adaptivity within the filter structure. In order to

track air-to-air missiles at close range, an eight-state filter incorporates a modified target dynamics model as well as online adaptation to target shape effects, changing target motion characteristics, and maximum signal intensity. It is shown to possess considerable performance potential for highly maneuverable targets despite background clutter. R.J.F.

N82-30000# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugfuehrung.

TECHNIQUES FOR THE DEVELOPMENT OF ERROR MODELS FOR AIDED STRAPDOWN NAVIGATION SYSTEMS

W. Lechner *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 28 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

An account is given of how adaptive low order error models were developed and adaptive filtering applied. The results were checked by using measured and simulated strapdown systems (SDS) data. In order to increase the accuracy levels of the inertial navigation systems (INS) additiona external measurements were used. The combination of the different data is often carried out by using the methods of Kalman filtering, which need sufficiently exact error models especially for the INS. As far as strapdown systems are concerned, the development of mathematical descriptions of the error behavior leads to high order models, because the dynamic environment of the SDS has to be taken into account. However, for real time navigational computations it is necessary to provide low order error models. An error model that conforms to the real SDS error behavior for all possible cases will thus generally lead to an unacceptably sophisticated error model with regard to the real time computations or numerical problems involved. The attempt is made to solve the problem by using adaptive error models and adaptive filtering, thereby avoiding some of the drawbacks of SDS. As an example measured and simulated strapdown data were used to demonstrate and to check the methods suggested. R.J.F.

N82-30001# Analytic Sciences Corp., Reading, Mass.

USE OF FILTERING AND SMOOTHING ALGORITHMS IN THE ANALYSIS OF MISSILE SYSTEM TEST DATA

Edward M. Duiven, Charles L. Medler, and Joseph F. Kasper, Jr. *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Fiiters and Kalman Filters Mar. 1982 48 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

Advanced techniques for the processing of missile system test data is discussed. Data from multiple references are used in a post flight analyzer that is based in large part on a smoothing algorithm. The objectives of the processing are to obtain the best estimate of overall system accuracy and to recover the maximum information about individual guidance system error contributors. A procedure for validating the models used in filtering and smoothing algorithms is presented. The procedure checks model validity using daa from multiple system tests. It employs well known statistical hypothesis testing methods in an innovative manner. Minuteman III flight test program data are discussed. In particular, the use of external reference information to enable determination of specific error characteristics which make up the model for the missile guidance system is discussed. It is shown that the ability to identify elements of the model is strongly influenced by the nature of the available reference systems and the chosen test plan. An algorithm bsed on a generalized likelihood ratio test is seen to be effective in isolating certain nonlinear error phenomena, provided that adequate reference data are available. Validation of the models for multiple phases in the operation of a ballistic missile system is discussed. A procedure based on statistical hypothesis testing methods is presented. The procedure can be used to determine whether a proposed test program is capable of isolating bias error phenomena. Alternatively, when data from multiple tests have been collected, the procedure provides a statistical assessment of the presence of bias error phenomena in the system being tested. R.J.F.

N82-30002# Litton Industries, Woodland Hills, Calif. Guidance and Control Systems Div.

INERTIAL NAVIGATION SYSTEM ERROR MODEL CONSIDERATIONS IN KALMAN FILTER APPLICATIONS

James R. Huddle *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 9 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

The full linear model describing the propagation of error for inertial navigation systems employing the local level, wander azimuth mechanization equations is developed. The model applies to Schuler tuned, space stable or strapdown inertial system instrumentations. For this model, alternative approximate linear models are developed which in different operational applications proved adequate as 'design models' for the application of Kalman estimation theory. R.J.F.

N82-30003# Singer-Kearfott, Little Falls, N. J.

SEPARATED BIAS ESTIMATION AND SOME APPLICATIONS

Bernard Friedland *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 13 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

The general theory of separating the estimation of the bias vector from the estimation of the dynamic state vector in applications of Kalman filtering is reviewed using a new derivation. Some of the extensions that various investigators contributed during the past decade are discussed. Several applications, including calibration and failure detection and identification, are discussed. R.J.F.

N82-30004# Defence Research Establishment, Ottawa. (Ontario). Electromagnetics Section.

COMPARISONS OF NONLINEAR FILTERS FOR SYSTEMS WITH NONNEGLIGIBLE NONLINEARITIES

D. F. Liang *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 34 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

The structural differences and performance characteristics of several distinct estimation algorithms, as applied to some practical continuous and discrete time state estimation problems are discussed. The extensive simulation results presented, indicate that when noise inputs are not too small and appropriate a priori estimates are available, the extended Kalman filter can be expected to perform satisfactorily. When nonlinear effects are significant, the realizable minimum variance filter is remarkably superior to any other filter investigated. When the level of noise inputs are large enough to effectively cover the effects of nonlinearities, no particular filter can be consistently superior to any other filter. R.J.F.

N82-30005# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

KALMAN FILTER SATELLITE ORBIT IMPROVEMENT USING LASER RANGING MEASUREMENTS FROM A SINGLE TRACKING STATION

K. F. Wakker and B. A. C. Ambrosius *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 16 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

A study to investigate the possibilities of using the laser range observations acquired at only one tracking station to provide real time position prediction updates during a pass, and also better predictions for subsequent passes over that station is presented. A computer program, called SORKA, was developed, which is based on an extended Kalman filter scheme. The computational approach adopted in SORKA is described in some datail. In particular, the methods to compute the state transition matrix and the state noise covariance matrix are emphasized. Typical divergence phenomena arising from processing accurate range only measurements are discussed and the effectiveness of techniques to reduce these instabilities is demonstrated. Laser range measurements acquired during 8 successive passes of GEOS-1 over the Kootwijk groundstation were processed and some results are presented. R.J.F.

N82-30006# Nichols Research Corp., Huntsville, Ala.

STATE ESTIMATION OF BALLISTIC TRAJECTORIES WITH

ANGLE ONLY MEASUREMENTS

Michael R. Salazar *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 29 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

The problem of state estimation of ballistic trajectories with angle only measurements is discussed. This type of problem becomes difficult when the observer is free falling and more difficult if the observer is then located in the plane of the observed trajectory. The methods described in this report are very effective against this most difficult case, and superior to existing angle only tracking filters in terms of stability, computational requirements, and tracking performance. The first method described herein utilizes the methods of Marquardt matrix conditioning and explicit Jacobian in determining the weighted least squares state estimate for the nonlinear, time varying, dynamic system of a ballistic trajectory with nonlinear noisy measurements. In this case both the equations of motion and the angle observations are nonlinear functions of the state. This Marquardt least squares (MLS) technique is a nonrecursive or batch process in that all the observations must be processed each time a state estimate is made. The method of incorporating a priori knowledge of the total energy into the MLS algorithm to assist in poor observability problems is also discussed. The second method takes the explicit Jacobian technique developed for the MLS algorithm and applies it to the recursive Kalman filter equations. This improved Jacobian-Kalman filter formulation together with the MLS for initialization form the complete angle only tracking algorithm. R.J.F.

N82-30007# California Univ., Los Angeles. School of Engineering and Applied Science.

NEW SMOOTHING ALGORITHMS FOR DYNAMIC SYSTEMS WITH OR WITHOUT INTERFERENCE

Kerim Demirbas *In* AGARD Advan. in the Tech. and Technol. of the Appl. of Nonlinear Filters and Kalman Filters Mar. 1982 66 p refs (For primary document see N82-29989 20-64)
Avail: NTIS HC A23/MF A01

The problem of state estimation for discrete models with or without interference is discussed. Three new smoothing algorithms are presented. The main idea for these smoothing algorithms is that of quantizing the states of the models to a finite set of states. This approach reduces the smoothing problem to a multiple (composite) hypothesis testing problem. Further, using three decoding techniques of information theory, the smoothing algorithms are developed. The first smoothing algorithm is referred to as optimum decoding based smoothing algorithm, which uses the Viterbi decoding algorithm. The second smoothing algorithm is referred to as stack sequential decoding based smoothing algorithm, which uses a stack sequential decoding algorithm. The third one is referred to as suboptimum decoding based smoothing algorithm, which uses a suboptimum decoding algorithm. R.J.F.

N82-29650# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

GEOMETRIC CONDITIONS WITH DIGITIZATION [GEOMETRISCHE BEDINGUNGEN BEI DER DIGITALISIERUNG]

Heinz Brueggemann *In its* Repts. on Cartography and Geodesy Ser. 1: Original Repts., No. 85 1981 p 5-11 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-30264# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

POTENTIALITY ASSESSMENT OF A PARALLEL STRUCTURE FOR THE SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

J. P. Boisseau, M. Enselme, D. Guiraud, and P. Leca *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 31-41 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982-1 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N82-30008# Practical Sciences, Inc., Carlisle, Mass.

A FRIEDLAND-LIKE FILTERING TECHNIQUE FOR ESTIMATING PIECEWISE CONSTANT CONTROLS IN DISCRETE LINEAR STOCHASTIC SYSTEMS

Harold L. Stalford Sep. 1981 62 p refs
(Contract N00014-80-C-0775; NR Proj. 041-568)
(AD-A112375; PSI-TR-81-2) Avail: NTIS HC A04/MF A01 CSCL 12/1

Discrete liner stochastic processes in which the control variables take unknown jumps at unknown times and remain constant between jumps are considered. A GLR algorithm is presented for detecting the jump time. The advent of the tri-filter technique together with the reinitialization procedure makes it unnecessary to augment the state x with the control u and to use augmented state filters in the estimation of state and piecewise constant controls. The new GLR algorithm avoids, therefore, computational problems that may be associated with processing large matrices in augmented state filters. It uses only unaugmented state filters and, consequently, it has particular application to problems involving a large number of state and/or jump variables. Author

N82-30009# Wisconsin Univ., Madison. Mathematics Research Center.

AN EMPIRICAL BAYESIAN APPROACH TO THE SMOOTH ESTIMATION OF UNKNOWN FUNCTIONS Technical Summary Report

Tom Leonard Feb. 1982 22 p refs
(Contract DAAG29-80-C-0041)
(AD-A114573; MRC-TSR-2339) Avail: NTIS HC A02/MF A01 CSCL 12/1

A Bayesian procedure is described for smoothly estimating unknown functions, given a finite set of observations. It is assumed that a suitable transformation of the function can be taken to possess a Gaussian prior distribution across function space. The five special cases estimation of a logistic density transform, the log intensity function of a non-homogeneous Poisson process, the log hazard function for survival data, the logit function in bioassay, and the mean value function in a possibly non-linear time series of the Kalman types or equivalently a regression function for possibly non-normal observations, are considered, and in each case a non-linear Fredholm equation is described for the posterior estimate. In two cases this reduces to a finite dimensional system. In all five cases an approximate procedure is developed which is particularly useful when the sample size is large. This approximates the function space prior by a multivariate normal prior on the coefficients in a linear approximation, and then proceeds by conventional Bayesian techniques. GRA

N82-30010# Wisconsin Univ., Madison. Mathematics Research Center.

APPLICATIONS OF THE EM ALGORITHM TO THE ESTIMATION OF BAYESIAN HYPERPARAMETERS Technical Summary Report

Tom Leonard Mar. 1982 20 p refs
(Contract DAAG29-80-C-0041)
(AD-A114537; MRC-TSR-2344) Avail: NTIS HC A02/MF A01 CSCL 12/1

Applications of the EM algorithm to the estimation of Bayesian hyperparameters are discussed and reviewed in the context of the author's philosophy involving the inductive and pragmatic modelling of sampling distributions and prior structures. Frequently the hyperparameters may be estimated from the data, thus avoiding the subjective assessment of these values. The ideas are applied to multiple regression models, histograms and multinomial distributions. A numerical example is described in the context of smoothing the cell probabilities of several multinomial distributions. Author (GRA)

N82-30011# Wisconsin Univ., Madison. Mathematics Research Center.

ON JOINTLY ESTIMATING PARAMETERS AND MISSING DATA BY MAXIMIZING THE COMPLETE-DATA LIKELIHOOD Technical Summary Report

Roderick J. A. Little and Donald E. Rubin Feb. 1982 10 p refs

(Contract DAAG29-80-C-0041)

(AD-A114533; MRC-TSR-2326) Avail: NTIS HC A02/MF A01 CSCL 12/1

One approach to handling incomplete data occasionally encountered in the literature is to treat the missing data as parameters and to maximize the complete data likelihood over missing data and parameters. This paper points out that although this approach can be useful in particular problems, it is not a generally reliable approach to the analysis of incomplete data. In particular, it does not share the optimal properties of maximum likelihood estimation, except under the trivial asymptotics in which the proportion of missing data goes to zero as the sample size increases. Author (GRA)

N82-30012# Wisconsin Univ., Madison. Mathematics Summary Report.

ASSESSING SENSITIVITY TO AN UNOBSERVED BINARY COVARIATE IN A NONRANDOMIZED EXPERIMENT WITH BINARY OUTCOME

Paul R. Rosenbaum and Donald B. Rubin Jan. 1982 20 p refs Sponsored by National Cancer Inst.

(Contracts DAAG29-80-C-0041; HRA-230-76-0300)

(AD-A114478; MRC-TSR-2321) Avail: NTIS HC A02/MF A01 CSCL 06/5

The results of nonrandomized clinical experiments are often disputed because patients at greater risk may be overrepresented in some treatment groups. This paper proposes a simple technique providing insight into the range of plausible conclusions from a nonrandomized experiment with binary outcome and observed categorical covariate. The technique assesses the sensitivity of conclusions to assumptions about an unobserved binary covariate relevant to treatment assignment, and is illustrated in a medical study of coronary artery disease. Author (GRA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N82-30013*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif.

APPLICATIONS TO AERONAUTICS OF THE THEORY OF TRANSFORMATIONS OF NONLINEAR SYSTEMS

George Meyer, Renjeng Su, and L. R. Hunt May 1982 13 p refs

(Contract N00014-76-C-1136)

(NASA-TM-84249; NAS 1.15:84249; A-8943) Avail: NTIS HC A02/MF A01 CSCL 12B

The development of the transformation theory is discussed. Results and applications concerning the use of this design technique for automatic flight control of aircraft are presented. The theory examines the transformation of nonlinear systems to linear systems. The tracking of linear models by nonlinear plants is discussed. Results of manned simulation are also presented. B.W.

N82-30014# Yale Univ., New Haven, Conn.

INFORMATION ABOUT MOVES IN EXTENSIVE GAMES 1:

Pradeep Dubey and Mamoru Kaneko 23 Mar. 1982 48 p refs

(Contract N00014-77-C-0518)

(AD-A114694; DISCUSSION-PAPER-625) Avail: NTIS HC A03/MF A01 CSCL 12/1

The relation between information patterns and Nash Equilibria in extensive games is explored. In games in which the level of information is intrinsically 'low', the Nash outcomes are invariant of the information. A varient model which has the feature that several players can move simultaneously at any position in the game was developed. Among all possible information patterns in a game there is a unique minimal one. The effect on Nash Equilibria that is caused solely by changes in the information pattern of an extensive game is considered. Author

N82-30015# Harvard Univ., Cambridge, Mass. Computation Lab.

A LOGARITHMIC TIME SORT FOR LINEAR SIZE NETWORKS

John H. Reif and Leslie G. Valiant May 1982 28 p refs

(Contract N00014-80-C-0674; Grant NSF MCS-79-21024)

(AD-A114857; TR-13-82) Avail: NTIS HC A03/MF A01 CSCL 12/2

We give a probabilistic algorithm for sorting on constant valence networks of N nodes such as the cube-connected cycles. We prove that for any input set of O(N) keys, the algorithm's execution time is greater than a constant times log N with vanishingly low likelihood. Since this constant factor is small our parallel sorting algorithm may be practical to implement. Author (GRA)

N82-30016# Harvard Univ., Cambridge, Mass. Computation Lab.

THE COMPLEXITY OF TWO PLAYER GAMES OF INCOMPLETE INFORMATION

John H. Reif Oct. 1981 56 p refs

(Contract N00014-80-C-0647; Grant NSF MCS-79-21024)

(AD-A114647; TR-35-81) Avail: NTIS HC A04/MF A01 CSCL 12/1

We consider two-player games of incomplete information in which certain portions of positions are private to each player and cannot be viewed by the opponent. We provide asymptotically optimal decision algorithms for space bounded games. We present various games of incomplete information which are shown to be universal in the sense that they are the hardest of all reasonable games of incomplete information. The problem of determining the outcome of these universal games from a given initial position is shown to be complete in doubly-exponential time. We also define 'private alternating Turing machines' which are a new type of alternating Turing machines with certain private types. The space complexity S(n) of these machines is characterized in terms of the complexity of deterministic Turing machines, with time bounds doubly-exponential in S(n). We also consider blindfold games, which are restricted games in which the second player is not allowed to modify the common position. We provide asymptotically optimal decision algorithms for space bounded blindfold games. GRA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N82-30017# Wisconsin Univ., Madison. Mathematics Research Center.

SIMULTANEOUS SIMILARITY OF MATRICES Technical Summary Report

Shmuel Friedland Mar. 1982 102 p refs

(Contract DAAG29-80-C-0041)

(AD-A114536; MRC-TSR-2345) Avail: NTIS HC A06/MF A01 CSCL 12/1

In this paper we solve completely and explicitly the long standing problem of classifying pairs of nxn complex matrices (A,B) under a simultaneous similarity. Roughly speaking, the classification decomposes to a finite number of steps. In each step we consider an open algebraic set. Then we construct a finite number of rational functions in the entries of A and B whose values are constant on all pairs similar to (A,B). The values of the functions phi sub i (A,B), i equals 1,...,s, determine a finite number of similarity classes. GRA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N82-30018# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

TELECOMMUNICATIONS TECHNICAL REPORT, VOLUME 9, NO. 6 [CSELT RAPPORTI TECNICI VOLUME 9, NO. 6]

Dec. 1981 53 p refs

(ISSN-0390-1815) Copyright. Avail: Issuing Activity

Backscattered mode power distribution in optical fibers is discussed. Field measurement, testing, and maintenance of installed optical cables and systems are reviewed. Optical receiver design for a light powered telephone set is discussed. Digital subscriber line transmission systems employing different line codes are compared. Alloy scattering mobility and energy gap evaluation by the dielectric model in liquid phase epitaxy are discussed. Multiple coupled dual mode waveguide filters are considered. Digital speech interpolation systems without speech detectors are considered. Route diversity systems above 10 GHz are discussed. OH reduction in preforms by isotope exchange is considered. For individual titles, see N82-30019 through N82-30027.

N82-30019# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

BACKSCATTERED MODE POWER DISTRIBUTION IN OPTICAL FIBRES c74

Bruno Costa, Pietro DiVita, Pierangelo Morra, Umberto Rossi, and Bruno Sordo *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 573-576 refs Presented at the 7th European Conf. on Opt. Commun., Copenhagen, 8-11 Sep. 1981 (For primary document see N82-30018 20-70)

Avail: Issuing Activity

A theoretical model is developed and an experimental investigation is carried out to determine accurately the mode distribution of backscattered signals. This makes possible easier and more precise backscattering data interpretation. Author

N82-30020# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

FIELD MEASUREMENT, TESTING AND MAINTENANCE OF INSTALLED OPTICAL CABLES AND SYSTEMS c74

Francesco Caviglia, Bruno Costa (Societa Italiana per l'Esercizio Telefonico, Rome), Alfredo Fausone, Feliciano Esposto (Societa Italiana per l'Esercizio Telefonico, Rome), and Franco Lombardi *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 577-582 refs Presented at the 7th European Conf. on Opt. Commun., Copenhagen, 8-11 Sep. 1981 (For primary document see N82-30018 20-70)

Avail: Issuing Activity

The various problems associated with testing of optical cables during and after installation, monitoring of transmission properties of optical links in adverse environment for experimental purposes, and digital system performance checking are discussed. The basic solutions adopted for the various field trials in Italy, as well as details on measuring equipment implementation, features and performance are given, along with a critical analysis of alternative approaches. Author

N82-30021# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

OPTICAL RECEIVER FOR A LIGHT POWERED TELEPHONE SET c74

Alberto Brosio, Agostino Moncalvo, Mauro Perino, and Paolo Solina *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 583-590 refs (For primary document see N82-30018 20-70)

Avail: Issuing Activity

Problems connected with remote powering of telephones through optical fibers are reviewed. Conditions on system design, such as low power consumption and low voltage circuitry, are discussed. Author

N82-30022# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

A COMPARISON OF DIGITAL SUBSCRIBER LINE TRANSMISSION SYSTEMS EMPLOYING DIFFERENT LINE CODES c32

Alberto Brosio, Umberto DeJulio (Societa Italiana per l'Esercizio Telfonico, Rome), Vincenzo Lazzari, Renzo Ravaglia, and Adler Tofanelli *In its* Telecommun. Tech. Rept., Vol. 9, No. 6, Dec. 1981 p 591-598 refs Repr. from IEEE Trans. on Commun., v. Com-29, no. 11, Nov. 1981 (For primary document see N82-30018 20-70)

Avail: Issuing Activity

The main characteristics and the performance of two systems implemented for two wire digital transmission on subscriber lines are presented. Both systems utilize different time intervals to transit bursts of bits in the two directions with an information bit rate of 80 kbit/s and a line bit rate in the bursts of 256 kbit/s. One system employing WAL2 as the line code, exhibits extreme circuitry simplicity and low power consumption. The other system, which employs CMI as the line code, shows better performance in the presence of line disturbances. Author

N82-30023# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

ALLOY SCATTERING MOBILITY AND ENERGY GAP EVALUATION BY THE DIELECTRIC MODEL IN LPE Ln(1-X)Ga(X)As(Y)P(1-7) SYSTEM c76

Domenico Campi, Claudio Papuzza, and Fulvio Taiariol *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Feb. 1981 p 599-604 refs (For primary document see N82-30018 20-70)

Avail: Issuing Activity

A Phillips and Van Vechten dielectric model was extended to Ga(x)In(1-x)As(y)P(1-y) layers matched to InP substrates at room temperature, to predict and explain some interesting features in quaternary systems. An energy gap Eg vs. composition quadratic equation in the range 0 < or = y < or = 1 fits accurately experimental data belonging to non-intentionally dopd LPE samples. Hall effect measurements are performed on the same samples. Alloy contributions were calculated by plotting the reciprocal mobility vs. composition and temperture. Author

N82-30024# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

DESIGN AND REALIZATION OF MULTIPLE-COUPLED DUAL MODE WAVEGUIDE FILTERS c32

Luciano Accatino and Roberto Salaroli *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 605-611 refs (For primary document see N82-30018 20-70)

Avail: Issuing Activity

Transfer functions of filters possessing real or imaginary finite transmission zeros can be conveniently fabricated at microwave frequencies making use of narrow band approximations and a multiple-coupled cavity structure. The mathematical techniques for obtaining intercavity couplings from a low-pass prototype transfer function are examined. Experimental characterization of a dual-mode cavity is presented. A comparison with a six-pole experimental prototype shows a very favorable agreement between theory and experiment. Author

N82-30025# Pontificia Universidade Catolica do Rio de Janeiro (Brazil).

PERFORMANCE ANALYSIS OF A DSI-ADPCM SYSTEM WITHOUT SPEECH DETECTORS c32

Jose Roberto BoissondeMarca, Maurizio Copperi (Centro Studi e Laboratori Telecommunicazioni), and Giancarlo Pirani (Centro Studi e Laboratori Telecommunicazioni) *In* Centro Studi e Laboratori Telecommunicazioni Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 613-616 refs (For primary document see N82-30018 20-70)

Avail: Issuing Activity

A combination of an instantaneous priority speech interpolation system and a differential encoding technique is considered. The goal of this approach is to achieve a gain of about 4 in terms of ratio between the number of input channels and that of output channels. While the current speech interpolation techniques require a speech detector recognizing the pauses in speech activity in each channel, a solution is proposed, which avoids the use of this device. The operation of the proposed algorithm, the simulation scheme that has been used for evaluating its performance, and some results obtained for different operating conditions and system parameters are described. Author

N82-30026# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

AN APPROACH TO COMPUTE THE PERFORMANCE OF ROUTE DIVERSITY SYSTEMS AT FREQUENCIES ABOVE 10 GHz **c32**

Loris Stola *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 617-620 refs Presented at the 29th Convegno Intern. delleComunicazioni, Genoa, 6-9 Oct. 1981 (For primary document see N82-30018 20-70)

Avail: Issuing Activity

A preliminary physical model is suggested for estimating the joint attenuation due to rain on terrestrial branching radio links. On the basis of the knowledge of the rain-rate cumulative distribution, the probability that a given attenuation is simultaneously exceeded on two radio links at the same frequency with angular separation may be calculated. Author

N82-30027# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).

OH REDUCTION IN PREFORMS BY ISOTOPE EXCHANGE **c72**

Eros Modone and Giacomo Roba *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 621-623 refs Repr. from Electron. Letters, v. 17, no. 21, Oct. 1981 (For primary document see N82-30018 20-70)

Avail: Issuing Activity

To reduce OH-ion content in MCVD preforms a method, based on a thermal-activated deuterium-hydrogen isotope exchange, was developed. Reaction was applied on the internal wall of silica substrate tubes to produce a buffering layer against hydrogen diffusion. Experimental results are presented and process potentialities are discussed. Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N82-30028 British Broadcasting Corp., Kingswood (England). Engineering Div.

RELATIONSHIPS BETWEEN NORMAL-INCIDENCE STATISTICAL ABSORPTION COEFFICIENTS

E. W. Taylor Apr. 1982 15 p refs

(BBC-RD-1982/4) Avail: British Broadcasting Corp., Kingswood Warren, Tadworth, Surrey, England

The theory underlying the absorption of sound at noral incidence is summarized and its extension to include absorption at random incidence is discussed. A chart of the relationships between the normal incidence and random incidence or statistical absorption coefficients is given, and a method of using this chart to obtain values of the statistical absorption coefficient from impedance tube measurements is described. Author

N82-30029# Federal Aviation Administration, Washington, D.C.

ESTIMATED AIRPLANE NOISE LEVELS IN A-WEIGHED DECIBELS

11 Feb. 1981 19 p refs

(AC-36-3B) Avail: NTIS HC A02/MF A01

Listings of estimated airplane noise levels in units of A-Weighted Sound Level in decibels (dBA) are provided. N.W.

N82-30030*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.

FORWARD VELOCITY EFFECTS ON FAN NOISE AND THE SUPPRESSION CHARACTERISTICS OF ADVANCED INLETS AS MEASURED IN THE NASA-AMES 40 BY 80 FOOT WIND TUNNEL Final Report

Michael T. Moore May 1980 161 p refs

(Contract NAS2-8675)

(NASA-CR-152328; NAS 1.26:152328; R79AEG626) Avail: NTIS HC A08/MF A01 CSCL 20A

Forward velocity effects on the forward radiated fan noise and on the suppression characteristics of three advanced inlets relative to a baseline cylindrical inlet were measured in the NASA Ames Research Center 40 x 80 foot Wind Tunnel. A modified JT15D turbofan engine in a quiet nacelle was the source of fan noise; the advanced inlets were a Conventional Takeoff/Landing (CTOL) hybrid inlet, a Short Takeoff/Landing (STOL) hybrid inlet, and a treated deflector inlet. Also measured were the static to flight effects on the fan noise of canting the baseline inlet 4 deg downward to simulate typical wing mounted turbofan engines. The CTOL hybrid inlet suppressed the high tip speed fan noise as much as 18 PNdB on a 61 m (200 ft) sideline scaled to a CF6 size engine while the STOL hybrid inlet suppressed the low tip speed fan noise as much as 13 PNdB on a 61 m (200 ft) sideline scaled to a OCSEE size engine. The deflector inlet suppressed the high tip speed fan noise as much as 13 PNdB at 61 m (200 ft) overhead scaled to a CF6 size engine. No significant changes in fan noise suppression for the CTOL and STOL hybrid inlets occurred for forward velocity changes above 21 m/s (68 ft/s) or for angle of attack changes up to 15 deg. However, changes in both forward velocity and angle of attack changed the deflector inlet noise unpredictably due to the asymmetry of the inlet flow field into the fan. Author

N82-30031# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 148. T-37B IN-FLIGHT CREW NOISE

Harald K. Hille Nov. 1981 15 p

(AF Proj. 7231)

(AD-A114943; AMRL-TR-75-50-Vol-148) Avail: NTIS HC A02/MF A01 CSCL 01/2

The T-37B is a USAF two-seat primary trainer aircraft. This report provides measured data defining the bioacoustic environments at flight crew/passenger locations inside this aircraft during normal flight operations. Data are reported at one location for 19 different flight conditions and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. GRA

N82-30032# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

FAR-FIELD ACOUSTIC DATA FOR THE TEXAS ASE, INC. HUSH HOUSE

Robert A. Lee Apr. 1982 287 p refs

(AF Proj. 7231)

(AD-A114564; AFAMRL-TR-81-148) Avail: NTIS HC A13/MF A01 CSCL 01/2

This report supplements AFAMRL-TR-73-110, which describes the data base (NOISEFILE) used in the computer program (NOISEMAP) to predict the community noise exposure resulting from military aircraft operations. The results of field test measurements to define the single-event noise produced on the ground by military aircraft/engines operating in the Texas ASE Inc. hush-house are presented as a function of angle (0 deg to 180 deg from the front of the hush-house) and distance (200 ft to 2500 ft) in various acoustic metrics. All the data are normalized to standard acoustic reference conditions of 59 F temperature and 70% relative humidity. Refer to Volume I of the AFAMRL-TR-73-110 report for discussion of the scope, limitations, and definitions needed to understand and use the data in this report. GRA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N82-30033*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

LOW ENERGY, LEFT-RIGHT SYMMETRY RESTORATION IN SO(N) GUTS

Richard Holman May 1982 19 p refs Submitted for publication

(NASA-TM-83940; NAS 1.15:83940) Avail: NTIS HC A02/MF A01 CSCL 20H

A general n step symmetry breaking pattern of SO(4K+2) down to SU sub C (3)xSU sub L (2)xU sub Y (1), which uses regular subgroups only, does not allow low energy left right

symmetry restoration. In these theories, the smallest mass scale at which such restoration is possible is approximately one billion GeV as in the SO(10) case. The unification mass in SO(4K+2) GUTS must be at least as large as that in SU(5). These results assumed standard values of the Weinberg angle and strong coupling constant. S.L.

N82-30034# National Inst. voor Kernfysica en Hoge Energieysica, Amsterdam (Netherlands).
LOW ENERGY PION AND MUON PHYSICS [FYSICA MET LARGE ENERGIE PIONEN EN MUONEN]
J. Konijn 1981 320 p refs In DUTCH
(NIKHEF-82/1) Avail: NTIS HC A14/MF A01

Lectures on low energy pion and muon physics treat pions, isopin, the Klein-Gordon equation, pion production, exotic atoms, nuclear polarization, elementary particle characteristics, optical-potential parameters (pionic atoms), experiments, and muon induced fission. For individual titles, see N82-30035 through N82-30040.

N82-30035# National Inst. voor Kernfysica en Hoge Energieysica, Amsterdam (Netherlands).
EXOTIC ATOMS [EXOTISCHE AACHEN]
J. Konijn *In its* Low Energy Pion and Muon Phys. 1981 p 41-105 refs In DUTCH (For primary document see N82-30034 20-72)
Avail: NTIS HC A14/MF A01

Exotic atoms are discussed in relation to formation of mesic atoms. The Fermi-Teller law, hydrogen containing combinations and muon induced fusion, muon transfer, pion transfer, mesic molecules, cascade transitions, radiative transition probabilities, Auger transition probabilities, energy levels, Lamb shift, vacuum polarization, finite size and charge distributions of the nucleus, root mean square nucleus radii and isotopy shifts, and electron screening are considered. Author (ESA)

N82-30036# National Inst. voor Kernfysica en Hoge Energieysica, Amsterdam (Netherlands).
NUCLEAR POLARIZATION [KERNPOLARISATIE]
J. Konijn *In its* Low Energy Pion and Muon Phys. 1981 p 105-138 refs In DUTCH (For primary document see N82-30034 20-72)
Avail: NTIS HC A14/MF A01

Nuclear polarization is discussed in relation to dynamic nuclear polarization, dynamic E2 effect in strongly deformed nuclei, quadropole interactions, transition intensities and fine structure, and hyperfine structure are considered. Author (ESA)

N82-30037# National Inst. voor Kernfysica en Hoge Energieysica, Amsterdam (Netherlands)
ELEMENTARY PARTICLE CHARACTERISTICS [DEELTJES EIGENSCHAPPEN]
J. Konijn *In its* Low Energy Pion and Muon Phys. 1981 p 138-162 refs In DUTCH (For primary document see N82-30034 20-72)
Avail: NTIS HC A14/MF A01

Elementary particle characteristics are discussed. Mass determination, magnetic moments, static quadrupole hyperfine structure in pionic atoms, influence of strong interaction, determination of quadrupole moments from pionic atoms, correction for magnetic dipole moment, and the rotation model test are investigated. Author (ESA)

N82-30038# National Inst. voor Kernfysica en Hoge Energieysica, Amsterdam (Netherlands).
OPTICAL POTENTIAL PARAMETERS FROM PIONIC ATOMS [OPTISCHE POTENTIAAL PARAMETERS UIT PIONISCHE ATOMEN]
J. Konijn *In its* Low Energy Pion and Muon Phys. 1981 p 163-198 refs In DUTCH (For primary document see N82-30034 20-72)
Avail: NTIS HC A14/MF A01

Optical potential parameters of pionic atoms include pion-nucleus interactions are discussed. Theory and experiment are compared. S and p wave scattering lengths, strong interaction effects from dynamic nuclear polarization, and an anomalous pion-nucleus interaction are investigated. The effective field or the reason the s wave interaction is repulsive is studied. Gradient potential, Lorentz-Lorentz effect, multiple scattering theorem, local or nonlocal optical potential, pion absorption, and absorption in heavy nuclei are considered. Author (ESA)

N82-30039# National Inst. voor Kernfysica en Hoge Energieysica, Amsterdam (Netherlands).
EXPERIMENTS [EXPERIMENTEN]
J. Konijn *In its* Low Energy Pion and Muon Phys. 1981 p 198-229 refs In DUTCH (For primary document see N82-30034 20-72)
Avail: NTIS HC A14/MF A01

Experiments were performed on the CERN cyclotron. Pion capture in Ta, Re, and Bi, quadrupole moments, nuclear gamma transitions, pion absorption in the nucleus, neutron multiplicity and angular momentum, and charged particles emission after pion absorption were studied. Author (ESA)

N82-30040# National Inst. voor Kernfysica en Hoge Energieysica, Amsterdam (Netherlands).
MUON INDUCED FISSION [MUON-GEINDUCEERDE KERNSPLIJTING]
J. Konijn *In its* Low Energy Pion and Muon Phys. 1981 p 229-282 refs In DUTCH (For primary document see N82-30034 20-72)
Avail: NTIS HC A14/MF A01

Muon induced fission is investigated. Electronics and data acquisition systems, checks and procedures, data analysis, background, prompt fission, muon decay after prompt fission, delayed fission, nucleus excitation by beta decay of a bound muon, and muon induced quadrupole photofission are discussed. Author (ESA)

N82-30041# Wisconsin Univ., Madison. Mathematics Research Center.
A GENERALIZED CURVE APPROACH TO ELEMENTARY PARTICLES Summary Report
L. C. Young and P. Nowosad Jan. 1982 17 p refs
(Contract DAAG29-80-C-0041)
(AD-A114504; MRC-TSR-2317) Avail: NTIS
HC A02/MF A01 CSCL 20/8

The theory of MRC Technical Summary Report 2067 is applied in a simplified form to a Relativistic One-Particle Universe, and boundary and symmetry conditions are imposed. The existence, for the particle, of a series of resonance states and a series of gauge states is derived. For the proton and the electron, a selection of such states account for the elementary particles observed to date. Author (GRA)

N82-30042# Smithsonian Astrophysical Observatory, Cambridge, Mass.
MEASUREMENTS OF IONIZATION BALANCE PARAMETERS IN ATOMIC IONS Progress Report, 1 Dec. 1980 - 31 Oct. 1981
J. L. Kohl Nov. 1981 16 p refs
(Contract DE-AC02-80ER-10631)
(DE82-004868; DOE/ER-10631/2) Avail: NTIS
HC A02/MF A01

The completion of preliminary measurements of (2s-2p) photon-products from inclined electron and C(3+) beams are described. The results verify the methods and instrumentation used to establish absolute scales for photon yields and current densities. A measurement of the shape of the electron impact C(+) (2p (2)P0 - 2p(2) (2)D)) threshold provided an upper limit on the electron energy spread which is found to be acceptable for dielectronic recombination measurements. An evaluation of a large aperture monochromator system shows that major reductions (factors of about 20) in the background photon rates from the individual beams can be achieved without any appreciable loss in efficiency compared to that of the present window and detector system. T.M.

N82-30043# Purdue Univ., Lafayette, Ind.
STUDY OF THE MOTION OF ELECTRONS IN NON POLAR CLASSICAL LIQUIDS. MEASUREMENT OF HALL EFFECT AND F. I. R. SEARCH FOR LOW ENERGY TRAPS Progress Report
9 Nov. 1981 20 p refs
(Contract DE-AC02-79ER-10375)

(DE82-004869; DOE/ER-10375/T2) Avail: NTIS HC A02/MF A01

During the last year the first measurements were obtained of the Hall mobility of electrons injected in an insulating non polar liquid (tetramethyl silane). The resulting Hall mobility appears to be approx. 10% higher than the drift mobility measured on the same sample. We are completing a data acquisition system to be able to correct for several experiments errors that became apparent due, e.g., to the random fluctuations of accelerator current, the nonhomogeneity of the applied electric fields, etc. Theoretical work aimed at the understanding of the observed electric field induced increase of the electron capture rate constant by N2O dissolved in Ar and Xe was carried out. Similarly to the conclusions reached in the case of O2 and SF6 the Stark effect is responsible for the electric field induced changes of the capture probability. Finally a large portion of the equipment necessary for the FIR photoconductivity experiment was constructed. During its testing it became obvious that changes of design were needed because the major source of noise is not expected to be detector noise but instead, shot noise associated with the main electron current. DOE

N82-30044# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.

CALCULATION OF THE NEUTRON STRENGTH FUNCTIONS OF ODD SPHERICAL NUCLEI WITHIN THE QUASIPARTICLE-PHONON MODEL

V. V. Voronov and Chan Zuy Khuong 1980 5 p refs

(JINR-E-4-13005) Avail: NTIS (US Sales Only) HC A02/MF A01

The s- and p-wave neutron strength functions of odd spherical nuclei were calculated in the framework of the quasiparticle-phonon model. Isoscalar and isovector componenta of residual forces are taken into account simultaneously. In contrast to the ordinary strength function calculations by the optical model, strength functions are expressed via the single quasiparticle wave function components being fragmented over many nuclear levels due to the residual interaction. A good agreement with experimental data is obtained. With a uniform set of Hamiltonian parameters the minimum and maximum of neutron strength functions are described simultaneously. DOE

N82-30045# Massachusetts Inst. of Tech., Cambridge.

LASER-INDUCED NUCLEAR ORIENTATION AND GAMMA ANISOTROPY IN SODIUM Ph.D. Thesis

Peter George Pappas Dec. 1980 156 p refs

(Contract DE-AS02-78ER-04629)
(DE82-006313; DOE/ER-04629/T2) Avail: NTIS HC A08/MF A01

The use of laser optical pumping to induce nuclear orientation in several isotopes and one isomer of atomic sodium vapor is described. Essentially complete nuclear polarization, P ~ 90%, was achieved in stable Na (23) when pumping with modest laser intensities (I approx. = 10 mW/sq cm). The volume of the sample cell was approximately 10 cc, and was filled with a sodiumm density of about 10" atoms/cc. Complete coverage of the Doppler distribution was accomplished with the use of trace amounts (less than or equal to 1 torr) of argon buffer gas to induce velocity changing collisions. A theoretical model which accurately predicts the amount of polarization was developed. The orientation of nuclei which are unstable to gamma decay can manifest itself in anisotropic gamma ray emission. This anisotropy can be used to measure isotope and isomer shifts, from which nuclear properties can be derived. A model is described which relates various laser and fubber gas parameters to the observed gamma anisotropy lineshape. This model facilitates the extraction of physical parameters from knowledge of the laser frequency at which the anisotropy is a maximum. T.M.

N82-30046# California Univ., Livermore. Lawrence Livermore Lab.

ORBXYZ: A 3D SINGLE-PARTICLE ORBIT CODE FOR FOLLOWING CHARGED PARTICLE TRAJECTORIES IN EQUILIBRIUM MAGNETIC FIELDS

D. V. Anderson, R. H. Cohen, J. R. Ferguson, B. M. Johnston, C. B. Sharp, and P. A. Willmann 30 Jun. 1981 25 p refs

(Contract W-7405-eng-48)
(DE82-005604; UCRL-53151) Avail: NTIS HC A02/MF A01

The single particle orbit code, TIBRO, was modified extensively to improve the interpolation methods used and to allow use of vector potential fields in the simulation of charged particle orbits on a 3D domain. A 3D cubic B-spline algorithm is used to generate spline coefficients used in the interpolation. Smooth and accurate field representations are obtained. When vector potential fields are used, the 3D cubic spline interpolation formula analytically generates the magnetic field used to push the particles. This field has del.BETA = 0 to computer roundoff. When magnetic induction is used the interpolation allows del.BETA does not equal 0, which can lead to significant nonphysical results. Presently the code assumes quadrupole symmetry, but this is not an essential feature of the code and could be easily removed for other applications. DOE

N82-30047# California Univ., Livermore. Lawrence Livermore Lab.

DIAGNOSTICS FOR THE ATA BEAM PROPAGATION EXPERIMENTS

T. J. Fessenden, W. L. Atchison, W. A. Barletta, J. F. Campbell, J. C. Clark, L. D. Clendenen, R. B. Fiorito, A. M. Frank, F. D. Lee, H. A. Koehler et al Nov. 1981 26 p refs

(Contracts W-7405-eng-48; N60921-81-LT-W0009; N60921-81-LT-W0026; DARPA Order 3718)
(DE82-004741; UCID-19245) Avail: NTIS HC A03/MF A01

The diagnostics required for the beam propagation experiment to be done with the ATA accelerator are listed. The ATA experimental environment is described and the status of beam diagnostics available at Livermore including recent developments is discussed. A prioritized list of accelerator and propagation diagnostics under consideration or in various stages of development is included. DOE

N82-30048# Michigan State Univ., East Lansing. Dept. of Physics.

NUCLEON-NUCLEON THEORY AND PHENOMENOLOGY Progress Report

Peter Signell 1981 12 p

(Contract DE-AC02-79ER-10516)
(DE82-006903; DOE/ER-10516/10) Avail: NTIS HC A02/MF A01

Progress is outlined on five interrelated subprojects: (1) derivation of the intermediate range nucleon-nucleon interaction with* the new dramatically altered pi pi s wave interaction and using a new method taht unphysical region that lies between the pi N and physical regions of the N anti N yields i N and i physical regions of the N anti N yields pi (with significantly improved accuracy for the nucleon-nucleon interaction); (2) construction of a short range phenomenological potential that, with the theoretical part mentioned above, gives a precise fit to the nucleon-nucleon data and is parameterized for easy use in nucleon calculations; (3) phase shift analyses of the world data below 400 MeV, especially the large amount of very precise data below 20 MeV and the new data near 55 MeV that have never been analyzed properly, and determining which phases are given by theory at which energies; (4) the introduction of our K-matrix formulation of the optimal polynomial expansion in order to accelerate convergence of the partial wave series at LAMPE energies; and (5) setting up of a cooperatively evaluated and verified permanent nucleon-nucleon data bank in the 0 to 1200 MeV range that can be used via Telenet dial in and by means of a published compendium. DOE

N82-30049# Minnesota Univ., Minneapolis.

REACTIONS OF IONS WITH ATOMIC AND MOLECULAR FREE RADICALS Progress Report, 1 May 1981 - 30 Apr. 1982

W. R. Gentry Nov. 1981 7 p refs

(Contract DE-AC02-76ER-02640)
(DE82-006890; DOE/ER-02640/13) Avail: NTIS HC A02/MF A01

Analysis and interpretation of the data on the reactions of H2( ) with N, C, O and F were completed, along with some supplementary investigations of collision-induced dissociation of the exotic species NH3(2) and CS2(3). As the focus of this project shifts to other systems and phenomena, construction of a new crossed, pulsed molecular beam apparatus has been begun, and is now about 75% complete. The new instrument will permit

state-resolved studies of energy transfer and reactive processes to be carried out with unprecendented sensitivity. DOE

N82-30050# Nebraska Univ., Lincoln.
PHOTOIONIZATION OF ATOMS Final Report, 1 Apr. 1976 - 30 Mar. 1981
J. A. R. Samson and A. F. Starace Nov. 1981 29 p refs
(Contract DE-AS02-76ER-02892)
(DE82-006896; DOE/ER-02892/30; COO-2892-30) Avail: NTIS HC A03/MF A01

Data on the results of photon-atom collisions is provided. The absolute probability for ejecting electrons from specific orbitals and determining their angular distributions, and the probability for one photon to eject two or more electrons were studied. Specific interactions that would provide sensitive tests for the various theoretical approximations used in calculating photoionization cross sections were measured. The techniques of photoelectron spectroscopy, photoionization mass spectrometry, and synchrotron radiation were used in many of the experiments. DOE

N82-30051# California Univ., Berkeley. Lawrence Berkeley Lab.
REVIEW OF MESON SPECTROSCOPY: QUARK STATES AND GLUEBALLS
M. S. Chanowitz Nov. 1981 92 p refs
(Contract W-7405-eng-48)
(DE82-005651; LBL-13593) Avail: NTIS HC A05/MF A01

Hadron spectroscopy is discussed. Light L = 0 mesons, light L = 1 mesons, antiquark antiquark quark quark exotics, a catalogue of higher quark antiquark excitations, heavy quarkonium, and glueballs are emphasized. DOE

N82-30052# Missouri Univ., St. Louis.
LOW-ENERGY ION-NEUTRAL COLLISIONS Progress Report, 1 Jun. 1981 - 31 May 1982
J. J. Leventhal Jan. 1982 12 p refs
(Contract DE-AS02-76ER-02718)
(DE82-007959; DOE/ER-02718/8; COO-2718-8) Avail: NTIS HC A02/MF A01

Work performed during the past year is described. New results on the pooling of internal energy in collisions between laser excited sodium atoms were obtained and submitted for publication. Work on a novel new method of determining atom densities for condensable vapors continued. DOE

N82-30053# Atomic Energy Research Establishment, Harwell (England). Theoretical Physics Div.
ELECTRON CAPTURE BY HIGHLY STRIPPED IONS
P. T. Greenland Jun. 1981 216 p refs
(DE82-700075; AERE-TP-876) Avail: NTIS (US Sales Only) HC A10/MF A01; DOE Depository Libraries

Theories of electron capture suitable for the description of rearrangement collisions between atomic hydrogen and completely stripped projectiles with charge greater than unity are described. The region of impact velocity considered lies between 0.05 and 3 au, which is of technological importance in fusion power devices. The semiclassical, impact parameter formalism is discussed and the use of atomic expansions at medium impact velocity is described. Experimental results for both completely and partially stripped projectiles are reviewed. The use of a molecular basis at low energy, and the role of pseudocrossings peculiar to the two center Coulomb interaction are described. Finally, purely classical techniques, in which the electron wavefunction is represented by an ensemble of Kepler orbits are considered. DOE

N82-30054# Japan Atomic Energy Research Inst., Tokyo.
THERMAL ION-MOLECULE REACTIONS IN OXYGEN-CONTAINING MOLECULES
Minoru Kumakura Feb. 1981 411 p refs
(DE82-700259; JAERI-M-9336) Avail: NTIS (US Sales Only) HC A18/MF A01; DOE Depository Libraries

The energetics of ions and the thermal ion-molecule reactions in oxygen-containing molecules were studied with a modified time-of-flight mass spectrometer. It was found that the translational energy of ion can be easily obtained from analysis of the decay curve using the time-of-flight mass spectrometer. The condensation-elimination reactions proceeded via cross- and homo-elimination mechanism in which the nature of intermediate-complex could be correlated with the nature of reactant ion. It was elucidated that behavior of poly-atomic oxygen-containing ions on the condensation-elimination reactions is considerably influenced by their oxonium ion structures having functional groups. In addition, the rate constants of the condensation-elimination reactions have affected with the energy state of reactant ion and the dipole moment and/or the polarizability of neutral molecule. It was clarified that the rate constants of the ion-molecule clustering reactions in poly-atomic oxygen-containing molecules such as cyclic ether of six member rings are very large and the cluster ions are stable owing to the large number of vibrational degree of freedom in the cluster ions. DOE

N82-30055# Korea Advanced Energy Research Inst., Seoul.
STUDY OF MATERIAL SCIENCE BY NEUTRON SCATTERING
H. J. Kim, B. C. Jeon, C. Y. Lee, and J. H. Ho 1980 49 p In KOREAN; ENGLISH summary
(DE82-700099; KAERI/RR-267/80) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

Progress on the development of a neutron diffraction method of accurate texture determination, a theoretical method of texture analysis, and texture anisotropy correlation analysis is described. Experimental pole figures were studied for oriented silicon steel and cold drawn copper wire selected as the respective specimen of sheet and fiber texture type. for theoretical analyses of these texture types of cubic crystal material, two computer codes were developed based on Bunge's formalism. Theoretical pole figures, inverse pole figures and orientation distribution function were calculated from three experimental pole figure inputs, and comparison of two results are discussed in detail to evaluate the analytical methods. DOE

N82-30056# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energies.
HADRON-NUCLEUS COLLISIONS. PART 1: PICTURE, DESCRIPTION PROCEDURE, CROSS-SECTIONS
Z. Strugalski 1981 14 p refs
(DE82-700206; JINR-E-1-81-154) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

Qualitative picture of high energy hadron-nucleus collision process, emerging from the analysis of experimental data, is presented. Appropriate description procedure giving a possibility of reproducing various characteristics of this process in terms of the data on elementary hadron-nucleon interaction is proposed. Formula reproducing hadron-nucleus collision cross sections is derived. Inelastic collision cross sections for pion-nucleus and proton-nucleus reactions at wide energy interval are calculated for Pb, Ag, and Al targets. A-dependence of cross sections for pion-nucleus and proton-nucleus collisions at nearly 50 GeV/c momentum were calculated and compared with existing experimental data. Energy dependence of cross sections for hadron-nucleus collisions is determined simply by energy dependence of corresponding cross sections for hadron-nucleon collisions; A-dependence is determined simply by nuclear sizes and nucleon density distributions in nuclei. DOE

N82-30057# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
ATOMIC AND MOLECULAR PHOTOELECTRON AND AUGER-ELECTRON-SPECTROSCOPY STUDIES USING SYNCHROTRON RADIATION Ph.D. Thesis
Stephen Hunt Southworth Jan. 1982 183 p refs
(Contract W-7405-eng-48)
(DE82-011033; LBL-13512) Avail: NTIS HC A09/MF A01

Electron spectroscopy, combined with synchrotron radiation, was used to measure the angular distributions of photoelectrons and Auger electrons from atoms and molecules as functions of photon energy. The branching ratios and partial cross sections were also measured in certain cases. By comparison with theoretical calculations, the experimental results are interpreted in terms of the characteristic electronic structure and ionization dynamics of the atomic or molecular sample. The time structure of the synchrotron radiation sources was used to record time-of-flight (TOF) spectra of the ejected electrons. The double-angle-TOF method for the measurement of photoelectron

angular distributions is discussed. This technique offers the advantages of increased electron collection efficiency and the elimination of certain systematic errors. An electron spectroscopy study of inner-shell photoexcitation and ionization of Xe, photoelectron angular distributions from H2 and D2, and photoionization cross sections and photoelectron asymmetries of the valence orbitals of NO are reported. DOE

N82-30058# Sao Paulo Univ. (Brazil). Inst. de Fisica.
LOW ANGULAR-MOMENTUM-CUTOFF IN STATISTICAL HEAVY ION PROCESSES
A. S. deToledo and Mahir S. Hussein Nov. 1980 16 p refs
(DE82-700197; IFUSP-244) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

Effects arising from the existence of lower-1 cutoff (1 sub(min) in Heavy-Ion fusion processes are discussed within the framework of the statistical theory. Both the fluctuaton cross-section as well as the angular cross-correlation function are seen to be qualitatively affected by 1 sub(min). DOE

N82-30059# Sao Paulo Univ. (Brazil). Inst. de Fisica.
CONTRIBUTION OF QUASI-ELASTIC PROCESSES TO THE TOTAL REACTION CROSS-SECTION OF HEAVY IONS
J. C. Acquadro, M. S. Hussein, D. Pereira, and O. Sala Dec. 1980 7 p refs
(DE82-700200; IFUSP-P-249) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

A simple estimate of the ratio of the total quasi-elastic cross-section to the total reaction cross section of heavy ions made and compared to the experimentally deduced for the (16)O + (27)Al system. The slow energy dependence of the ratio is stressed. DOE

N82-30060# Washington Univ., Seattle.
ISOSPIN MIXING IN MAGNESIUM-24 Ph.D. Thesis
Charles David Hoyle 1981 126 p refs
(Contract DE-AC06-76ER-01388)
(DE82-011084; DOE/ER-01388/513) Avail: NTIS HC A07/MF A01

The (ALPHA)-(BETA) circular polarization correlation asymmetry was measured for the pure Gamow-Teller decay of (28)A1, for the pure Fermi decay of (14)0 and for the mixed decay of the (24)Al 4( ) ground state to the 8.437 MeV, 4( ) state in (24)Mg. Results were obtained for the pure Gamow-Teller and Fermi decays. From the results of the (24)Al decay the isospin mixing of the 8.437 MeV, 4( ) state and the 9.515 MeV, 4( ) analog state in (24) Mg was determined. The charge dependent matrix element mixing these two states was -95 + -36 keV. This is the largest charge dependent matrix element observed in (ALPHA) decay. The large value suggests the existence of a (RADICAL)T = 1 nuclear force. DOE

N82-30061# Flinders Univ., Bedford Park (Australia). Inst. for Atomic Studies.
POLARIZATION POTENTIAL FOR INTERMEDIATE ENERGY ELECTRON-ATOM SCATTERING
I. E. McCarthy, B. C. Saha, and A. T. Stelbovics Dec. 1980 8 p refs
(DE81-700821; FIAS-R-73) Avail: NTIS (US sales only) HC A02/MF A01;DOE Depository Libraries

The adiabatic approximation to the effective electron-atom potential gives an asymptotic form (-)r(+4), where (-) is the static polarizability. It is shown that intermediate and high energies, where this approximation is invalid, (-) is replaced by an oscillatory, energy dependent coefficient. DOE

N82-30062# Flinders Univ., Bedford Park (Australia). Inst. for Atomic Studies.
ANALYTIC APPROXIMATIONS FOR INTEGRATED ELECTRON-ATOM EXCITATIONS
I. E. McCarthy, B. C. Saha, and A. T. Stelbovics Sep. 1980 22 p refs Sponsored in part by the Australian Inst. for Nuclear Science and Engineering and the Australian Research Grants Committee
(DE81-700820; FIAS-R-70) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

Accurate calculations of atomic excitations require estimates of the effect of higher excitation on the effective (optical) potential coupling various reaction channels. The total cross section for a particular excitation is propotional to the maximum contributin of that excitation to the imaginary part of the elastic momentum-space optical potential, and is typical of the contribution to the potential in general. Analytic expressions relevant to the calculation of optical potentials are given. Their validity is estimated by comparison with more-accurate calculations and with experimental excitation cross sections. DOE

N82-30063# Johns Hopkins Univ., Baltimore, Md. Dept. of Physics.
SEARCH FOR EXCITED LEPTONS IN THE NEXT GENERATION OF EXPERIMENTS
G. Domokos and S. Koevski-Domokos Sep. 1981 7 p refs (Contract DE-AS02-76ER-03285)
(DE82-006959; JHU-HET-8108; DOE/ER-0325/40) Avail: NTIS HC A02/MF A01

Production cross sections of excited leptons in e( )e(+) annihilation experiments are estimated. Light excited states can be produced below the characteristic energy scale at which hypothetical constituents of leptons become bound: therefore the estimates are expected to be valid for E/sub cm/ less than or equal to 100 GeV, and to a large degree, model independent. The results are expressed in terms of measurable low energy parameters. It is concluded that high precision experiments are needed for an effective search for excited leptons. DOE

N82-30064# Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Nuclear Physics.
INTERPLAY BETWEEN COHERENT AND STOCHASTIC EFFECTS IN DEEPLY INELASTIC COLLISIONS OF HEAVY IONS. 1: THE SELF-CONSISTENT MEAN-FIELD APPROXIMATION
S. Mukamel, U. Smilansky, D. H. E. Gross (Hahn-Meitner Inst. fuer Kernforschung), K. Moehring (Hahn-Meitner Inst. fuer Kernforschung), and M. I. Sobel (Brooklyn College) Jan. 1981 42 p refs
(DE81-700442; WIS-Ph-81/4) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

A theory which describes in a consistent and uniform manner the development of the deeply inelastic collision through all its stages is presented. It is shown how the two collision partners, which were initially in their ground states, become excited in the approach phase mainly through coherent processes. Gradually, denser regions of the internal excitation spectrum are populated, and a statistical description in terms of stochastic rate equations naturally emerges. The interaction between the collective degrees of freedom and the internal system is treated in a self-consistent way: The heating up of the internal system is due to the energy dissipated from the collective motion, while the force acting on the collective coordinates is derived from the internal density matrix. The internal system is discussed in the adiabatic representation. Therefore, effects which are due to the development of large deformations can be accounted for in a reliable manner. The ability to describe coherent processes is shown to be intimately connected with the time resolution implicit in this quantum-statistical approach. DOE

N82-30065# Washington Univ., Seattle. Lab. of Nuclear Physics.
WEAK NUCLEAR INTERACTIONS IN NEON-21 AND NEON-18 Ph.D. Thesis
Richard D. VonLintig 1981 200 p refs
(Contract DE-AC06-76ER-01388)
(DE82-011085; DOE/ER-01388/514) Avail: NTIS HC A09/MF A01

Weak meson exchange among nucleons were studied. Measurements of the circular polarization of 2.789 MeV gamma rays associated with the 2.789/2.796 MeV parity mixed doublet in (21)Ne are described. Measurements of the 0( ) - 0(+) beta decay from (18)Ne to the 1.081 MeV 0(+) state of (18)F, is also reported. The significance of the results to the theory of weak nonleptonic interactions is examined. The circular polarization of the 2.789 MeV radiation from (21)Ne is (20 + - 26) x 10(+4). Simultaneous measurements of the circular polarization of 2.439 MeV radiation, indicate an absence of bias in the measurements. The relative probability of the 0( ) - 0(+) (1.081 MeV) decay from (18)Ne is (2.26 + - .37) x 10(+4).

The two body (or meson exchange) contribution to this transition is the isospin analog of parity mixing between the 1042-keV (J/sup (LC OMEGA)/;T = 0( ):1) and 1081-keV (J/sup (LC OMEGA)/;T = 0(+);0) states of (18)F. It is shown that a theoretical relation exists between these two weak interaction phenomena emphasizing the importance of the beta decay measurement to non-leptonic weak interaction physics. DOE

N82-30027# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).
OH REDUCTION IN PREFORMS BY ISOTOPE EXCHANGE
Eros Modone and Giacomo Roba *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 621-623 refs Repr. from Electron. Letters, v. 17, no. 21, Oct. 1981 (For primary document see N82-30018 20-70)
Avail: Issuing Activity

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N82-30066*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PHENOMENOLOGICAL OPTICAL POTENTIAL ANALYSIS OF PROTON-CARBON ELASTIC SCATTERING AT 200 MeV
Hari B. Bidasaria (Old Dominion Univ.) and Lawrence W. Townsend Jun. 1982 21 p refs
(NASA-TM-84498) Avail: NTIS HC A02/MF A01 CSCL 20H

Differential cross sections for 200 MeV protons elastically scattered from C-12 were analyzed utilizing a local, complex, spin-dependent optical potential with a harmonic well radial dependence. Analyses were performed using the WKB and eikonal approximations. For the latter, first-order corrections to he phase shifts were incorporated to account for the spin-orbit contribution. Large disagreement between theory and experiment was observed when the usual Thomas form for the spin-orbit potential was utilized. Substantial improvement was obtained by allowing the parameters in the central and spin-orbit potential terms to vary independently. Author

N82-30067# Rockefeller Univ., New York.
EXPERIMENTAL STUDIES OF ELEMENTARY-PARTICLE INTERACTIONS AT HIGH ENERGIES Technical Progress Report
1 Nov. 1981 17 p refs
(Contract DE-AC02-81ER-40033)
(DE82-005516; DOE/ER-40033/T1; DOE/ER-40033/15) Avail: NTIS HC A02/MF A01

The experimental high energy physics research at Rockefeller University is described. Status of the R-108 experiment at the CERN ISR is briefly described, and the research program at Fermilab is outlined. The analysis of Fermilab experiment No. 396, designed to measure the elastic and diffractive dissociation cross sections of (LC OMEGA)/sup +-/, K/sup +-/, and p/sup +-/ on p at 0.03 to 0.1 (GeV/c)(2), has been completed. Test data taken with a new experimental setup (TREAD) for studying low t elastic and diffraction scattering by photons and hadrons are briefly discussed. DOE

N82-30068# California Univ., Livermore. Lawrence Livermore Lab.
ENERGY AND TECHNOLOGY REVIEW
I. F. Stowers, ed., R. B. Crawford, ed., M. A. Esser, ed., and E. ONeal, ed. Dec. 1981 37 p refs
(Contract W-7405-eng-48)
(DE82-006985; UCRL-52000-81-12) Avail: NTIS HC A03/MF A01

Research programs at Lawrence Livermore Laboratories are described. These include: the generation of intense electron beams for military applications; SYNROC, a permanent means of radioactive-waste storage in synthetic rock compounds; and studies of respiration using a positron camera with radioisotopes produced in the 100-MeV electron linear accelerator. DOE

N82-30069# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Waste Management Planning Div.
LONG-TERM HIGH-LEVEL WASTE TECHNOLOGY. COMPOSITE REPORT Quarterly Technical Report, Apr. - Jun. 1981
W. R. Cornman, comp. Dec. 1981 130 p refs
(Contract DE-AC09-76SR-00001)
(DE82-011847; DP-81-157-2) Avail: NTIS HC A07/MF A01

Research and development studies on the immobilization of high-level wastes from the chemical reprocessing of nuclear reactor fuels are summarized. The reports are grouped under the following tasks: (1) program management and support; (2) waste preparation; (3) waste fixation; and (4) final handling. Some of the highlights are: leaching properties were obtained for titanate and tailored ceramic materials being developed at ICPP to immobilize zirconia calcine; comparative leach tests, hot-cell tests, and process evaluations were conducted of waste form alternatives to borosilicate glass for the immobilization of SRP high-level wastes, experiments were run at ANL to qualify neutron activation analysis and radioactive tracers for measuring leach rates from simulated waste glasses; comparative leach test samples of SYNROC D were prepared, characterized, and tested at LLNL; encapsulation of glass marbles with lead or lead alloys was demonstrated on an engineering scale at PNL; a canister for reference Commercial HLW was designed at PNL; a study of the optimization of salt-crete was completed at SRL; a risk assessment showed that an investment for tornado dampers in the interim storage building of the DWPF is unjustified. DOE

N82-30070# Atomic Energy of Canada Ltd., Pinawa (Manitoba).
SYVAC: A COMPUTER PROGRAM FOR ASSESSMENT OF NUCLEAR FUEL WASTE MANAGEMENT SYSTEMS INCORPORATING PARAMETER VARIABILITY
K. W. Dormuth and G. R. Sherman Aug. 1981 62 p refs
(DE82-902002; AECL-6814) Avail: NTIS (US Sales Only) HC A04/MF A01; DOE Depository Libraries

This users' manual describes SYVAC, a computer program designed for use in post-closure assessment of risk associated with a nuclear fuel waste disposal system, taking into account variability and uncertainty in parameters defining the state of the disposal vault and its surroundings. Transport of radionuclides through a component of the system, such as a rock mass, is represented by a submodel that depends on system parameters. Several submodels are executed in sequence under the control of SYVAC to provide an estimate of the consequence associated with a given set of parameter values. Many such estimates are made, each time using a set of parameter values obtained by random sampling from distributions of specified type and range. The end result is a probability density function of consequence estimates together with detailed time-dependent information on all runs. DOE

74 OPTICS

Includes light phenomena.

N82-30071* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
OPTICAL CRYSTAL TEMPERATURE GAUGE WITH FIBER OPTIC CONNECTIONS Patent
Madan M. Sharma, inventor (to NASA) (TRW Defense and Space Systems Group, Redondo Beach, Calif.) Issued 6 Jul. 1982 9 p Filed 12 Sep. 1980 Supersedes N81-15818 (19 - 06, p 0825) Sponsored by NASA
(NASA-Case-MSC-18627-1; US-Patent-4,338,516; US-Patent-Appl-SN-186881; US-Patent-Class-250-226; US-Patent-Class-250-231R; US-Patent-Class-374-162R) Avail: US Patent and Trademark Office CSCL 20F

An optical temperature gauge uses a semiconductor crystal with a band-edge shift property which is temperature dependent. An external narrow band light source provides optical excitation through a optical fiber and light energy thus passed through the

crystal is conveyed by a second optical fiber to a light-to-electric transducers at an external location. The crystal can be located in cryogenic or other systems, to provide remote read-out. The light wavelength is varied (scanned) in a repetitive pattern in source with the instantaneous wavelength passing over the band-edge wavelength during each cycle of the scan. The timing of the crossover is related to the temperature of the crystal by electronic means. Several alternative elements of instrumentation are disclosed. A variation in the basic measurement apparatus is also disclosed, in which the band gap voltage of a light source such as a laser diode is evaluated at the time of band-edge crossover in the crystal and converted to a temperature value.
Official Gazette of the U.S. Patent and Trademark Office

N82-30072# Central Inst. for Industrial Research, Oslo (Norway).
ENCIRCLED ENERGY FOR ABERRATION-FREE, LARGE F-NUMBER SYSTEMS WITH CENTRALLY OBSCURED CIRCULAR PUPILS
J. Stamnes, H. Heier, and S. Ljunggren 11 Dec. 1980 39 p refs
(PB82-145194; ISBN-82-7267-273-1) Avail: NTIS HC A03/MF A01 CSCL 20F

The encircled energy is computed for large f number aberation free, annular aperture systems with linear obscuration ratios between 0.0 and 0.9. The computations are based on an algorithm due to Hopkins. The results are displayed graphically as contour lines showing the fraction of the total energy which fails within small circles centered on the optical axis in selected receiving planes parallel to the geometrical focal plane. Author

N82-30073*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DUAL APERTURE MULTISPECTRAL SCHMIDT OBJECTIVE Patent Application
Peter O. Minott, inventor (to NASA) Filed 13 May 1982 15 p
(NASA-Case-GSC-12756-1; US-Patent-Appl-SN-378535) Avail: NTIS HC A02/MF A01 CSCL 20F

A dual aperture, off-axis catadioptic Schmidt objective is formed by symmetrically aligning two pairs of Schmidt objectives on opposite sides of a common plane. Each objective has a spherical primary mirror with a spherical focal plane and center of curvature aligned along an optic axis laterally spaced apart from the common plane. A multiprison beamsplitter with burned dichoic layers and a convex entrance and concave exit surface optically concentric to the center of curvature may be positioned at the focal plane. The primary mirrors of each objective may be connected rigidly together and may have equal or unequal focal lengths. NASA

N82-30074*# TRW, Inc., El Segundo, Calif. Technology Research Center.
INTEGRATED OPTICS TECHNOLOGY STUDY Final Report
B. Chen 18 Jun. 1982 103 p refs
(Contracts NAS7-100; JPL-956157)
Avail: NTIS HC A06/MF A01 CSCL 20F

The materials and processes available for the fabrication of single mode integrated electrooptical components are described. Issues included in the study are: (1) host material and orientation, (2) waveguide formation, (3) optical loss mechanisms, (4) wavelength selection, (5) polarization effects and control, (6) laser to integrated optics coupling,(7) fiber optic waveguides to integrated optics coupling, (8) souces, (9) detectors. The best materials, technology and processes for fabrication of integrated optical components for communications and fiber gyro applications are recommended. S.L.

N82-30075*# TRW, Inc., El Segundo, Calif. Technology Research Center.
INTEGRATED OPTICS TECHNOLOGY STUDY Final Report
B. Chen, T. Findakly, and R. Innarella 15 Apr. 1982 134 p refs Prepared for JPL
(Contracts NAS7-100; JPL-95617)
(NASA-CR-169201; NAS 1.26:169201) Avail: NTIS HC A07/MF A01 CSCL 20F

The status and near term potential of materials and processes available for the fabrication of single mode integrated electro-optical components are discussed. Issues discussed are host material and orientation, waveguide formation, optical loss mechanisms, wavelength selection, polarization effects and control, laser to integrated optics coupling fiber optic waveguides to integrated optics coupling, sources, and detectors. Recommendations of the best materials, technology, and processes for fabrication of integrated optical components for communications and fiber gyro applications are given. R.J.F.

N82-30076# Defence Research Establishment, Ottawa. (Ontario).
A DATA ACQUISITION SYSTEM FOR A COARSE OPTICAL POWER SPECTRUM ESTIMATOR
D. L. Desaulniers, C. Brochu, and F. Paquet May 1981 63 p refs
(AD-A114986; DREO/TN-81-5) Avail: NTIS HC A04/MF A01 CSCL 20/6

The system consists of the detector, an electronic sub-system and software for a NOVA 1200 mini-computer and Xerox Sigma 9 computer using nine track magnetic tape. The user has a choice of several gains and biases, log or linear mode of operation, automatic or manual sampling and a variable sampling frequency. The signals coming from the 64 photo-diodes in the detector are first multiplexed onto one channel. The multiplexed signal is amplified, biassed and amplified again before it is sampled and digitized. The digital samples are then stored on the magnetic tape for later processing. The major components of the system are described below. The implementation of the system to estimate optical power spectra will be reported in subsequent publications. GRA

N82-30077# City Univ. of New York, N. Y.
LINEAR AND NONLINEAR PULSE PROPAGATION IN OPTICAL WAVEGUIDES Final Technical Report, 17 Jan. 1977 - 30 Sep. 1981
Narkis Tzoar Griffiss AFB, N.Y. RADC Apr. 1982 59 p refs (Contract F19628-77-C-0114; AF Proj. 2304)
(AD-A114734; RADC-TR-82-31) Avail: NTIS HC A04/MF A01 CSCL 09/1

This report investigates nonlinear pulse propagation (solitons) and self-phase modulation, as well as the nonlinear mode mixing in optical fibers. It also investigated the effects of longitudinal inhomogeneities on linear propagation in optical wave guides and calculated radiation loss due to tapers. GRA

N82-30078# Tokyo Univ. (Japan). Inst. for Nuclear Study.
PHENOMENOLOGICAL OPTICAL POTENTIALS OF HEAVY IONS
Shigeru Kubono Jan. 1981 28 p refs Presented at the Workshop on Phenomenological Interactions of Heavy Ions, Osaka, 30 Oct. - 1 Nov. 1980
(DE82-700218; INS-398) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

Heavy ion interactions through elastic scattering, inelastic scattering and transfer reactions were studied. The large cross sections at far back angles observed in elastic scattering of even-even nuclei are explained by optical potentials which are transparent at the strong absorption radius region. The mass number dependence of the constant cross section regions which appear in the 1800 excitation functions are explained by a surface transparent potential set with slight energy dependence. However, the structure seen at 900 and 1800 can be simultaneously explained only by a parity dependent potential. The channel coupling effects of a strong inelastic scattering is included approximately by modifying the imaginary term. However, when strong Coulomb excitation dominates the inelastic scattering, the optical potential needs to have a new term of long range absorption. Heavy ion spin orbit term was studied through transfer reactions and inelastic scatterings, giving the order of V sub(so) - 0.7 - 3 MeV for the (13)C, (15)N and (19)F potentials. DOE

N82-30079# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Engineering and Technical Services.
PRECISION-ANALOG FIBER-OPTIC TRANSMISSION SYSTEM M.S. Thesis
G. Stover Jan. 1981 60 p refs
(Contract W-7405-eng-48)
(DE82-010156; LBL-13352) Avail: NTIS HC A04/MF A01

The design, experimental development and construction of

a dc-coupled precision analog fiber optic link are described. Topics covered include overall electrical and mechanical system parameters, basic circuit organization, modulation format, optical system design, optical receiver circuit analysis, and the experimental verification of the major design parameters. Author

N82-30019# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).
BACKSCATTERED MODE POWER DISTRIBUTION IN OPTICAL FIBRES
Bruno Costa, Pietro DiVita, Pierangelo Morra, Umberto Rossi, and Bruno Sordo *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 573-576 refs Presented at the 7th European Conf. on Opt. Commun., Copenhagen, 8-11 Sep. 1981 (For primary document see N82-30018 20-70)
Avail: Issuing Activity

N82-30020# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).
FIELD MEASUREMENT, TESTING AND MAINTENANCE OF INSTALLED OPTICAL CABLES AND SYSTEMS
Francesco Caviglia, Bruno Costa (Societa Italiana per l'Esercizio Telefonico, Rome), Alfredo Fausone, Feliciano Esposto (Societa Italiana per l'Esercizio Telefonico, Rome), and Franco Lombardi *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 577-582 refs Presented at the 7th European Conf. on Opt. Commun., Copenhagen, 8-11 Sep. 1981 (For primary document see N82-30018 20-70)
Avail: Issuing Activity

N82-30021# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).
OPTICAL RECEIVER FOR A LIGHT POWERED TELEPHONE SET
Alberto Brosio, Agostino Moncalvo, Mauro Perino, and Paolo Solina *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Dec. 1981 p 583-590 refs (For primary document see N82-30018 20-70)
Avail: Issuing Activity

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N82-30080# Nagoya Univ. (Japan). Inst. of Plasma Physics.
SIMPLE METHOD OF SHEET PLASMA PRODUCTION FOR HIGH CURRENT NEGATIVE ION I
Joshin Uramoto Apr. 1982 31 p refs
(IPPJ-574) Avail: NTIS HC A03/MF A01

By arranging two rectangular permanent magnets on both sides of a cylindrical plasma along a magnetic field, two types of sheet plasma with thickness of about an ion cyclotron diameter can be produced. The one is called 'noshi-mochi' (flattened rice cake) plasma, whose width is determined by the vacuum chamber diameter. The other is called 'kishimen' (flattened noodle) plasma, whose width is determined by the aperture diameter of discharge anode. M.G.

N82-30081# Nagoya Univ. (Japan). Inst. of Plasma Physics.
NBT-1M DESIGN REPORT
M. Fujiwara, H. Tsuchidate, and T. Kamimura Apr. 1982 30 p refs
(IPPJ-579) Avail: NTIS HC A03/MF A01

Results obtained in NBT-1 and EBT-1/S devices are used in the design of the NBT-1M being constructed to obtain experimental scaling laws of plasma confinement and hot electron annulus in a regime that is denser and has a higher temperature. Topics covered include characteristics of BT magnetic fields, wedge coil configurations, machine design parameters of NBT-1M, efficient use of microwave power, and numerical results of magnetic field and particle orbits in the NBT-1M. A.R.H.

N82-30082# Nagoya Univ. (Japan). Inst. of Plasma Physics.
EXPERIMENT ON HEATING WITH SIMULTANEOUS INJECTION OF NEUTRAL-BEAM AND LOWER HYBRID WAVES IN THE JIPP T-II TORUS
N. Noda, O. Kaneko, K. Ohkubo, R. Sugihara, K. Kawahata, K. Sakurai, Y. Oka, K. Kawasumi, S. Tanahashi, and J. Fujita Apr. 1982 25 p refs
(IPPJ-567) Avail: NTIS HC A02/MF A01

A hydrogen beam of 16 kV, 4 A was co-injected into hydrogen plasmas and coupled to an rf of 800 MHz, up to 150 kW. It was observed with the measurement of parallel charge exchange neutrals that the fast ions above 16 keV are enhanced by the interaction with the lower hybrid waves. The enhancement is critically reduced when the line averaged electron density is higher than 1.6 x 10 to the 13th power cm(-3) both in the toroidal fields of 22 kG and 16 kG. For the 22 kG case, the cause f the reduction may be related to the location of the turning point of the incident waves; that is, the turning point, in higher densities, locates outside the region where the fast ions produced by neutral beam injection are relatively abundant. For the 16 kG case, however, this interpretation is valid only when a part of the incident wave energy is transferred into waves of shorter wavelengths. The ion temperature increment in the simultaneous heating agrees with the sum of those in the individual heatings even when the beam-rf interaction is considerably strong. M.G.

N82-30083# Nagoya Univ. (Japan). Inst. of Plasma Physics.
IS MAGNETIC COMPRESSION EFFECTIVE IN BURNING TOKAMAK EXPERIMENTS?
K. Yamazaki Mar. 1982 15 p refs
(IPPJ-566) Avail: NTIS HC A02/MF A01

Adiabatic compression heating is effective as far as Alcator energy confinement scaling is fulfilled, but not effective for recent PDX and ISX-B global loss scalings. Other merits of magnetic compression, especially the possibility of velocity-space thermonuclear instabilities, are discussed for burning plasma experiments. Author

N82-30084# Nagoya Univ. (Japan). Inst. of Plasma Physics.
A MODEL OF DISPARITIONS BRUSQUES (SUDDEN DISAPPEARANCE OF ERUPTIVE PROMINENCES) AS AN INSTABILITY DRIVEN BY MHD WAVES
J. Sakai and K. I. Nishikawa Apr. 1982 30 p refs
(IPPJ-569) Avail: NTIS HC A03/MF A01

A mode of 'disparitions brusques' (sudden disappearance of eruptive prominences) is discussed based on the Kippenhahn and Schluter configuration. It is shown that Kippenhahn and Schluter's current sheet is unstable against magnetic reconnecting modes during the lifetime of quiescent prominences. Disturbances in the form of fast magnetosonic wave originating from nearby active regions or the changes of whole magnetic configuration due to newly emerged magnetic flux may trigger a rapid growing instability associated with magnetic field reconnection. This instability gives rise to disruptions of quiescent prominences and also generates high energy particles. Author

N82-30085# Nagoya Univ. (Japan). Inst. of Plasma Physics.
LOMEGA: A LOW FREQUENCY, FIELD IMPLICIT METHOD FOR PLASMA SIMULATION
D. C. Barnes and T. Kamimura Apr. 1982 37 p refs
(IPPJ-570) Avail: NTIS HC A03/MF A01

Field implicit methods for low frequency plasma simulation by the LOMEGA (Low OMEGA) codes are described. These implicit field methods may be combined with particle pushing algorithms using either Lorentz force or guiding center force models to study two-dimensional, magnetized, electrostatic plasmas. Numerical results for omega sub e delta $t>>1$ are described. M.G.

N82-30086# Nagoya Univ. (Japan). Inst. of Plasma Physics.
TIME DEPENDENT DRIFT HAMILTONIAN
Allen H. Boozer Apr. 1982 15 p refs
(IPPJ-571) Avail: NTIS HC A02/MF A01

A simple guiding center Hamiltonian H is proposed which obeys all the necessary conditions for asymptotic validity. It agrees to lowest order in gyroradius to system size with Alfven's drift velocity in both time varying and time independent fields. In axisymmetry, a canonical momentum is conserved. The Hamiltonian and the canonical variables are given in magnetic coordinates, which not only give simpler equations but also measure

the drift motion of the particles relative to the plasma structure. M.G.

N82-30087# Nagoya Univ. (Japan). Inst. of Plasma Physics.
LINKED TANDEM MIRROR CONFIGURATION AS A POSSIBLE STEADY STATE HIGH BETA PLASMA CONTAINER
Kazunari Ikuta Apr. 1982 17 p refs
(IPPJ-572) Avail: NTIS HC A02/MF A01

The possibility of achieving steady state high beta plasma confinement in toroidal geometry is considered in detail by closing off the ends of tandem mirrors entirely by flux bridges, where beta is the ratio of plasma pressure to the magnetic pressure. The key problem of this approach seems to be the magnetic design of magnetohydrodynamically stabilized, preferentially leaky bridges. M.G.

N82-30088# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RELATIVISTIC GENERALIZATION OF STRONG PLASMA TURBULENCE
Abraham C.-L. Chian Feb. 1982 7 p refs Proposed for presentation at the First Latin-Am. Workshop on Plasma Phys.
(INPE-2322-PRE/078) Avail: NTIS HC A02/MF A01

Solitons may play an important role in the evolution of strong plasma turbulence. The properties of ion acoustic and Langmuir solitons are examined by taking into consideration the effect of relativistic mass variations. It is shown that relativistic ion acoustic solitons may exist, whereas simple relativistic Langmuir solitons cannot exist in an infinite plasma. Envelope relativistic Langmuir solitons may be obtained when modulation interactions take place. Author

N82-30089# Australian Inst. of Nuclear Science and Engineering, Lucas Heights. Dept. of Plasma Physics.
PARAMETRIC AMPLIFICATION OF ALFVEN WAVES
G. A. Collins 1981 81 p refs Presented at the 13th AINSE Plasma Phys. Conf., Lucas Heights, Australia, 9 Feb. 1981
(INIS-mf-6424) Avail: NTIS HC A05/MF A01

Wave research in progress is concerned with the structure of transverse MHD shock waves and the parametric amplification of Alfven waves. However, the main effort is directed toward the construction of the TORTUS Tokamak which will be used for Alfven wave studies in high temperature plasmas. L.F.M.

N82-30090# Stanford Univ., Calif. Lab. of High Temperature Gasdynamics.
HIGH-MAGNETIC-FIELD MHD-GENERATOR PROGRAM Quarterly Report, 1 Apr. - 30 Jun. 1981
T. Nakamura, R. H. Eustis, M. Mitchner, S. A. Self, J. K. Koester, and C. H. Kruger Jul. 1981 86 p refs
(Contract DE-AC01-80ET-15611)
(DE82-005215; DOE/ET-15611/6) Avail: NTIS HC A05/MF A01

Progress in an experimental and theoretical program designed to investigate MHD channel phenomena which are important at high magnetic fields is described. The areas of research include nonuniformity effects, boundary layers, Hall field breakdown, the effects of electrode configuration and current concentrations, and studies of steady-state combustion disk and linear channels in an existing 6 Tesla magnet of small dimensions. In the study of the effects of nonuniformities, experiments were performed to test a multi-channel, fiber optics diagnostic system that yields time-resolved temperature profiles in an MHD chanel. For the study of magneto-acoustic fluctuation phenomena, a one dimensional model was developed to describe the performance of a non-ideal MHD generator with a generalized electrical configuration. A two dimensional MHD computer code was developed which predicts the dependence on electrode and insulator dimensions of the onset of interelectrode Hall field breakdown, as initiated either by breakdown in the insulator or in the plasma. DOE

N82-30091# SRI International Corp., Menlo Park, Calif. Molecular Physics Lab.
COLLISIONAL PROCESSES OF INTEREST IN MFE PLASMA RESEARCH Annual Report, 1 Oct. 1980 - 30 Sep. 1981
R. E. Olson 15 Oct. 1981 28 p refs
(Contracts DE-AT03-76ET-53025; DE-AM03-76F-00115; SRI Proj. 5362)
(DE82-002137; DOE/ET-53025/T10; MP-81-174) Avail: NTIS HC A03/MF A01

Deuterium (+) formation collision processes, and the determination of scattering cross sections used to diagnose properties of magnetically confined plasmas were investigated. Theoretical calculations on the differential (angular) scattering of HO and DO on Cs were completed and the mechanisms and trends in the electron detachment cross sections for collisions of H(+) and D(+) on He, Ne, and the alkali and heavy alkaline earth atom systems were determined. The electron capture and ionization cross sections for the C(5+), N(5+), and O(6+) + H systems in the energy range from 12 eV/amu to 2.1 MeV/amu were also determined. DOE

N82-30092# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
COMPARATIVE STUDY OF FUNDAMENTAL AND SECOND HARMONIC ICRF WAVE PROPAGATION AND DAMPING AT HIGH DENSITY IN THE ALCATOR TOKAMAK Ph.D. Thesis
Marcel P. J. Gaudreau Sep. 1981 409 p refs
(Contract DE-AC02-78ET-51013)
(DE82-004871; DOE/ET-51013/27) Avail: NTIS HC A18/MF A01

The real and imaginary parts of the parallel and perpendicular wave numbers are measured with extensive magnetic probe diagnostics for a spectrum of plasma parameters and compared with theory. Qualitative and quantitative evaluations of the wave structure and scaling laws are derived analytically in simple geometries and computed numerically for realistic plasma parameters and profiles. General figures of merit, such as radiation resistance and quality factor, are also derived and compared with the experiment. Secondary effects of the high power wave launching, such as changes in plasma current, density, Z/sub eff/, energetic neutral flux, soft X-rays, neutron flux, and impurities are also discussed. A general synthesis of the many engineering, physics, and experimental problems and conclusions of the Alcator A ICRF program are inspected. Finally, the derived and experimentally determined scaling laws and engineering constraints are used to estimate the ICRF requirements, advantages, and potential pitfalls of the next generations of experiments on the Alcator Tokamaks. Author

N82-30093# Cornell Univ., Ithaca, N. Y. School of Applied and Engineering Physics.
PLASMA SPECTROSCOPY IN THE PRESENCE OF FAST PARTICLES
R. Jayakumar and H. H. Fleischmann Sep. 1981 59 p refs
(Contract DE-AS02-76ET-53017)
(DE82-010952; DOE/ET-53017/T2) Avail: NTIS HC A04/MF A01

The influence of monoenergetic fast charged particles present in a Maxwellian plasma on excitation and ionization processes is studied in the context of plasmas and fast particle diagnostics. It is shown that the influence can be significant for relative fast-particle densities as low as 10(+4). On the other hand, the indirect influence through secondary electrons is found to be small in an approximate analytical calculation. Allowed transitions are significantly enhanced in the presence of fast particles while spin-forbidden excitations are hardly affected. Although the limiting conditions for LTE, partial LTE or Corona equilibria are nearly unaltered, the populations of highly excited states are enhanced. Under partial-LTE ons, this enhancement occurs without significantly influencing the relative populations of these upper levels. Illustrative calculations on the intensities and intensity ratios for outer and inner shell lines of diagnostic interest are presented. DOE

N82-30094# Columbia Univ., New York. Plasma Physics Lab.
DEUTERIUM PLASMA-MATERIAL WALL INTERACTIONS Final Report, 1 May 1979 - 30 Sep. 1981
J. K. Tien and R. A. Gross Oct. 1981 8 p refs
(Contract DE-AS02-77ET-52008)
(DE82-007529; DOE/ET-52008/2) Avail: NTIS HC A02/MF A01

During the final year of this program we completed our study of plasma interactions with material surfaces. Analysis of unipolar arc damage on the microstructure of Ti-6Al-4V was the final part of the study of plasma-metal interactions. Unipolar arcing was found to be the most severe damage mechanism for this alloy and the degree of damage was very sensitive to the metal microstructure. ATJ-S graphite specimens were exposed to hot deuterium plasma and were examined for surface damage. The residual gas in the plasma device was studied using a monopole gas analyzer so as to determine the type and quantity of hydrocarbon species produced by the plasma-graphite interaction. DOE

N82-30095# Science Applications, Inc., La Jolla, Calif.
EFFECT OF CHARGE EXCHANGE ON ION GUNS AND AN APPLICATION TO INERTIAL-ELECTROSTATIC CONFINEMENT DEVICES
D. C. Baxter and G. W. Stuart 17 Dec. 1981 33 p refs
(Contract DE-AC03-80ER-53097)
(DE82-007631; SAI-023-81-428LJ) Avail: NTIS HC A03/MF A01

A model that includes the effects of charge exchange and ionization in the ion guns was analyzed. The model predicts three main features of the observed neutron flux: neutron output proportional to gun current, neutron production localized at the center of the evacuated chamber, and neutron production decreasing with increasing neutral background gas density. The ion gun output is modelled as a mixture of ions and fast neutrals with energies ranging from zero to the maximum gun energy. A survey of the possible operating parameters indicates that the device was probably operated at or near the most efficient combined values of voltage and background pressure. Applications of the theory to other devices are discussed. DOE

N82-30096# Japan Atomic Energy Research Inst., Tokyo. Div. of Thermonuclear Fusion Research.
COMPUTATIONAL STUDIES OF TOKAMAK PLASMAS
Tomonori Takizuka, Toshihide Tsunematsu, Shinji Tokuda, Masafumi Azumi, Gen-ichi Kurita, Takashi Tuda, Kimitaka Itoh, Yukio Tanaka (Fujitsu Ltd.), Toshihiko Matsuura (Fujitsu Ltd.), and Tatsuoki Takeda Feb. 1981 80 p refs In ENGLISH; JAPANESE summary
(DE82-700129; JAERI-M-9354) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

Computational studies of Tokamak plasmas are extensively advanced. Many computational codes were developed by using several kinds of models, i.e., the finite element formulation of MHD equations, the time dependent multidimensional fluid model, and the particle model with the Monte-Carlo method. These codes are applied to the analyses of the equilibrium of an axisymmetric toroidal plasma (SELENE), the time evolution of the high-beta Tokamak plasma (APOLLO), the low-n MHD stability (ERATO-J) and high-n ballooning mode stability (BOREAS) in the INTOR Tokamak, the nonlinear MHD stability, such as the positional instability (AEOLUS-P), resistive internal mode (AEOLUS-I) etc., and the divertor functions. DOE

N82-30097# Japan Atomic Energy Research Inst., Tokyo. Div. of Thermonuclear Fusion Research.
ONE-DIMENSIONAL TRANSPORT CODE FOR THE SIMULATION OF D-T BURNING TOKAMAK PLASMA: POISE I
Tatsuzo Tone, Koichi Maki (Hitachi Ltd., Ibaraki), Masao Kasai (Mitsubishi Atomic Power Industries, Inc., Omiya), and Hidetsugu Nishida (Toya Information Systems Co., Tokyo) Nov 1980 122 p refs In JAPANESE; In JAPANESE; ENGLISH summary
(DE82-700470; JAERI-M-9167) Avail: NTIS (US Sales Only) HC A03/MF A01; DOE Depository Libraries

A one dimensional transport code for D-T burning Tokamak plasma was developed, which simulates the spatial behavior of fuel ions (D, T), alpha particles, impurities, temperatures of ions and electrons, plasma current, neutrals, heating of alpha and injected beam particles. The basic transport equations are represented by one generalized equation so that the improvement of models and the addition of new equations may be easily made. A model of burn control using a variable toroidal field ripple is employed. DOE

N82-30098# Science Applications, Inc., Boulder, Colo. Plasma Research Inst.
GENERAL FREQUENCY GYROKINETICS
X. S. Lee, J. R. Myra, and P. J. Catto Dec. 1981 26 p refs
(Contract DE-AC03-76ET-53057)
(DE82-010386; SAI-254-81-423-LJ/PRI-36) Avail: NTIS HC A03/MF A01

A gyrokinetic formalism is developed which enables a treatment of linear waves of arbitrary wave frequency (NU) in the eikonal approximation for general magnetic field geometries. The treatment is an extension of previous gyrokinetic techniques which were restricted to the low frequency ((NU) < (LAMBDA)) regime. In addition to the expected magnetic drift terms in the wave-particle resonances, additional corrections related to the distinction between particle and guiding center location, and to oscillatory terms in the particle orbits can be important for general frequencies and wave numbers. Specific applications of the formalism in an inhomogeneous magnetic field are presented for both the ion drift-cyclotron instability at finite beta, and the gyroresonant damping of ion Bernstein modes in Maxwellian plasmas. DOE

N82-30099# Science Applications, Inc., Boulder, Colo. Plasma Research Inst.
IDEAL MAGNETOHYDRODYNAMIC STABILITY OF AXISYMMETRIC MIRRORS
D. A. DIppolito, B. Hafizi, and J. R. Myra Dec. 1981 32 p refs
(Contract DE-AC03-76ET-53057)
(DE82-010385; SAI-254-81-424-LJ/PRI-37) Avail: NTIS HC A03/MF A01

The governing partial differential equation for general mode number pressure-driven ballooning modes in a long-thin, axisymmetric plasma is derived within the context of ideal magnetohydrodynamics. It is shown that the equation reduces in special limits to the Hain-Luest equation, the high-m diffuse p(psi) ballooning equation, and the low-m sharp-boundary equation. A low-(ALPHA) analytic solution of the full partial differential equation is presented for quasiflute modes in an idealized tandem mirror model to elucidate the relationship of the various limiting cases. DOE

N82-30100# Oak Ridge National Lab., Tenn. Fusion Energy Div.
FINITE-BETA EFFECTS ON THE NONLINEAR EVOLUTION OF THE (m = 1;n = 1) MODE IN TOKAMAKS
J. A. Holmes, B. A. Carreras, H. R. Hicks, V. E. Lynch, and K. E. Rothe Jan. 1982 54 p refs
(Contract W-7405-eng-26)
(DE82-007124; ORNL/TM-8063) Avail: NTIS HC A04/MF A01

The stability and evoluton of ISX-B-like plasmas are numerically studied using a reduced set of resistive magnetohydrodynamic (MHD) equations. For a sequence of equilibria stable to ideal modes, the n = 1 mode changes from a tearing branch to a pressure-driven branch as (ALPHA)/sup p/ is increased. When this mode is unstable at low beta, it is just the (m = 1;n = 1) tearing mode. Higher n modes also become linearly unstable with increasing (ALPHA)/sub p/; they are essentially pressure driven and have a ballooning character. For low values of beta the instability is best described as a (ALPHA)/sub p/ distortion of the (m = 1;n = 1) tearing mode. This mode drives many other helicities through toroidal and nonlinear couplings. As (ALPHA/sub p/ is increased, the growth of the m = 1 island slows down in time, going from exponential to linear before reconnection occurs. If (ALPHA/sub p/ is large enough, the island saturates without reconnection. A broad spectrum of other modes, driven by the (m = 1;n = 1) instability, is produced. These results agree with some observed features of MHD activity in ISX-B. DOE

N82-30101# Los Alamos Scientific Lab., N. Mex.
COMMENTS ON IDEAL BALLOONING
R. Y. Dagazian and R. B. Paris (CEA, Fontenay-aux-Roses, France) Jan. 1982 26 p refs
(Contract W-7405-eng-36)
(DE82-010020; LA-9055-MS) Avail: NTIS HC A03/MF A01

Ideal ballooning modes are investigated for the case of plane

magnetized slab geometry. Toroidal effects are simulated by a gravitational acceleration periodically varying along magnetic field lines. High shear is shown to be very effective in stabilizing these modes even when field line curvature is most unfavorable to their stability. DOE

N82-30102# Tennessee Univ., Tullahoma. Space Inst.
TWO-DIMENSIONAL COUPLED FLUID AND ELECTRODYNAMIC CALCULATIONS FOR A MHD DCW CHANNEL WITH SLAG LAYERS
B. L. Liu Jan. 1982 40 p refs
(Contract DE-AC02-79ET-10815)
(DE82-010654; DOE/ET-10815/67; TR-7 2 4-81-01) Avail: NTIS HC A03/MF A01

A fully coupled, two dimensional numerical method of modeling linear, coal-fired MHD generators is developed for the case of a plasma flow bounded by a slag layer on the channel walls. The governing partial differential equations for the plasma flow, slag layer and electrodynamics are presented and their coupling discussed. An iterative, numerical procedure employing non-uniform computational meshes and appropriate tridiagonal matrix solution schemes for the equations is presented. The method permits the investigation of the mutual plasma flow-slag layer development for prescribed wall temperatures, electrode geometry, slag properties and channel loading. In particular, the slag layer-plasma interface properties which require prior specification in an uncoupled analysis comprise part of the solution in the present approach. Results are presented for a short diagonally connected generator channel and include contour plots of the electric potential and current stream function as well as transverse and axial profiles of pertinent plasma properties. The results indicate that a thin electrode slag layer can be maintained in the presence of reasonable current density levels. DOE

N82-30103# Science Applications, Inc., Boulder, Colo. Plasma Research Inst.
STABILITY OF LOW-FREQUENCY MODES IN TANDEM MIRRORS AND BUMPY TORI
Kang Tsang and Peter J. Catto Nov. 1981 31 p refs
(Contract DE-AC03-76ET-53057)
(DE82-006016; SAI-254-81-387-LJ; PRI-34) Avail: NTIS HC A03/MF A01

The system of equations appropriate for describing low frequency modes ((LAMBDA) - (LAMBDA)/sub i/) in general geometry for a three species plasma is derived. The derivation employs an eikonal ansatz and for simplicity assumes Maxwellian unperturbed distribution functions, but permits arbitrary beta and asymmetry. The full system of equations includes ballooning, interchange and compressional Alfven modes, and drift waves. As an example of the general forms, the stability of electron rings in bumpy tori and/or tandem mirrors is considered. Some simple estimates of the conditions necessary for stable operation are presented. DOE

N82-30104# Westinghouse Electric Corp., Pittsburgh, Pa. Fusion Programs Dept.
ENGINEERING DESIGN OF A TOROIDAL DIVERTOR FOR THE EBT-S FUSION DEVICE. PHASE 2: EBT-S DIVERTOR PROJECT Final Report
L. P. Mai, F. S. Malick, W. C. Brenner, R. Chianese, G. Gibson, F. M. Heck, E. M. Iwinski, A. Y. Lee, D. A. Sink, and R. W. Stooksberry 1 Jul. 1981 83 p refs
(Contract W-7405-eng-26)
(DE82-007654; ORNL/Sub-81/21086/2; WFPS-TME-81-026) Avail: NTIS HC A05/MF A01

The mechanical, structural, thermal, electrical, and vacuum design of a magnetic toroidal divertor system for the Elmo Bumpy Torus (EBT-S) is presented. The engineering of the divertor was performed during the second of three phases of a program aimed at the selection, design, fabrication, and installation of a magnetic divertor for EBT-S. Details of the divertor design and the modest modifications that are required to the EBT-S device and facility to accommodate the divertor system are presented. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N82-30105* National Aeronautics and Space Administration. Pasadena Office, Calif.
ELECTROMIGRATION PROCESS FOR THE PURIFICATION OF MOLTEN SILICON DURING CRYSTAL GROWTH Patent
Paul J. Shlichta, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 18 May 1982 7 p Filed 10 Feb. 1981 Sponsored by NASA
(NASA-Case-NPO-14831-1; US-Patent-4,330,359; US-Patent-Appl-SN-233269; US-Patent-Class-156-608; US-Patent-Class-156-602; US-Patent-Class-422-246) Avail: US Patent and Trademark Office CSCL 20B

A process for the purification of molten materials during crystal growth by electromigration of impurities to localized dirty zones. In the Czochralski crystal growing process, the impurities are electromigrated away from the crystallization interface by applying a direct electrical current to the molten silicon for electromigrating the charged impurities away from the crystal growth interface. The edge-defined film-fed crystal growth process, a direct electrical current is applied between the two faces which are used in forming the molten silicon into a ribbon. The impurities, migrated to one side only of the crystal ribbon, may be removed or left in place. If left in place, they will not adversely affect the ribbon when used in solar collectors. The migration of the impurity to one side only of the silicon ribbon is especially suitable for use with asymmetric dies which preferentially crystallize uncharged impurities along one side or face of the ribbon.

Official Gazette of the U.S. Patent and Trademark Office

N82-30106*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN ANALYTICAL APPROACH TO THERMAL MODELING OF BRIDGMAN TYPE CRYSTAL GROWTH: ONE DIMENSIONAL ANALYSIS. COMPUTER PROGRAM USERS MANUAL
Ernestine K. Cothran May 1982 88 p refs
(NASA-TM-82487; NAS 1.15:82487) Avail: NTIS HC A05/MF A01 CSCL 20B

The computer program written in support of one dimensional analytical approach to thermal modeling of Bridgman type crystal growth is presented. The program listing and flow charts are included, along with the complete thermal model. Sample problems include detailed comments on input and output to aid the first time user. R.J.F.

N82-30107# Microwave Associates, Inc., Burlington, Mass.
MM AND T PROGRAM FOR THE ESTABLISHMENT OF PRODUCTION TECHNIQUES FOR HIGH POWER BULK SEMICONDUCTOR LIMITERS Final Report
Yoginder Anand Jul. 1979 158 p refs
(Contract DAAB07-76-C-0039)
(AD-A113129; DELET-TR-76-0039) Avail: NTIS HC A08/MF A01 CSCL 13/8

This report describes the Production Engineering of high power bulk semiconductor limiters for X-band frequencies. A high power bulk semiconductor limiter assembly, consisting of a high resistivity silicon bulk limiter and followed by a two-stage junction diode limiter was developed for the frequency band of 9 - 9.65 GHz. This receiver protector handles 20 kW of peak power at a 0.25 microsec pulse width and 4000 Hz pulse repetition frequency. High volume semiconductor batch processed and fabrication techniques were implemented to obtain this low cost and reliable receiver protector. A pilot line was established to fabricate the bulk limiters in production quantities for reliability testing and to supply the U.S. Army with eighty-five (85) units.

Author (GRA)

N82-30108# Northeastern Univ., Boston, Mass.
DYNAMICAL FRICTION IN CONDENSED MATTER Progress Report, 15 Apr. - 15 Dec. 1981
J. B. Sokoloff and C. H. Perry Dec. 1981 11 p refs

(Contract DE-AC02-81ER-10866)
(DE82-005216; DOE/ER-10866/1) Avail: NTIS HC A02/MF A01

Joint theoretical experimental studies of a variety of systems reflecting motion of one set of species (ions, defects, layers) relative to another set of species (channels, lattices, layers) are discussed. The rate of energy dissipation, its frequency, temperature and pressure dependence are calculated as well as electronic contributions to the damping. Experimental studies of Y2O3-ZrO2, hollandite, perovskite, intercalated graphite and dichalcogenides are related to the theoretical models, including a predicted electric field effect. DOE

N82-30109# Cleveland Crystals, Inc., Ohio.
REPORT ON QUALITY OF 100 MM PHI KD*P CRYSTALS Final Report
Oct. 1981 23 p
(Contract W-7405-eng-48)
(DE82-006774; UCRL-15399) Avail: NTIS HC A02/MF A01

Ten 90% KD*P crystals with 10(+) cm cross section were grown and six of them were characterized. One of these crystals was fabricated into a 10 cm aperture Pockels cell. DOE

N82-30110# Illinois Univ., Urbana. Dept. of Physics.
CONFIRMATION OF MCMILLAN'S CONCEPT OF DISCOMMENSURATIONS IN 2H-TANTALUM DISELENIDE Ph.D. Thesis
Bryan H. Suits 1981 101 p refs
(Contract DE-AC02-76ER-01198)
(DE82-005969; DOE/ER-01198/1371) Avail: NTIS HC A06/MF A01

The S-77 nuclear magnetic resonance spectra in a single crystal sample of 2H-TaSe2 was examined to study the charge density wave (CDW) in this compound and to test a concept put forth by McMillan. The temperature dependence of the NMR lineshape obtained by Couturie from 4.2 K to 1300 K was compared with a lineshape theory which encompasses McMillan's theory as well as the theory which preceded McMillan's. Precision electrical resistance measurements were used which, when compared to the recent X-ray diffraction results of Fleming, Moncton, McWhan and DiSalvo, provide an independent measure of the CDW properties. Results confirm McMillan's hypothesis. DOE

N82-30111# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
CONJECTURE ON THE CRITICAL FRONTIER OF THE FERROMAGNETIC POTTS MODEL ON PLANAR LATTICES
Constantino Tsallis and Aglae C. N. deMagalhaes 1980 18 p refs
(DE82-700089; CBPF-NF-029/80) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

A conjecture is stated for the approximate critical frontiers of the ferromagnetic q-state Potts model on planar lattices. This conjecture is verified, within a satisfactory degree of accuracy, for a variety of anisotropic and/or 'inhomogeneous' planar lattices (as well as for the first and second neighbor square one), and enables the prediction of a considerable number of new results: 20 independent critical points and a few critical lines. DOE

N82-30112# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
INDUCED MAGNETISM VIA CONDUCTION ELECTRON EXCHANGE: APPLICATION TO PrAl SUB 2
L. Palermo (Inst. de Fisica da U.F.F.) and X. A. daSilva Jul. 1980 12 p refs
(DE82-700086; CBPF-A-0021/80) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

The magnetization, susceptibility and magnetic specific heat of PrAl2 versus temperature are studied within a model where the onset of magnetism is due to mutual magnetization of the rare-earth ions and the conduction electrons, the ionic magnetization process being ban Bleck-like. The crystal field, bandwith and exchange parameters of the model which fit the available experimental data are 2.5 meV, 7000 meV and 341 meV, respectively. DOE

N82-30113# Sandia Labs., Albuquerque, N. Mex.
METHOD OF PREPARING POLYCRYSTALS OF BORON NITRIDE
V. Alexeevsy, A. Bochko, S. Dzamarov, D. Karpinos, G. Karjuk, I. Kolomiets, A. Kurdjumov, M. Pivovarov, I. Frantsevich, and V. Yarosh Dec. 1981 9 p Transl. into ENGLISH of Romanian patent no. 65,509, 1979
(Contract DE-AC04-76DP-00789)
(DE82-005836; SAND-82-6001) Avail: NTIS HC A02/MF A01

This patent covers the preparation of superhard polycrystalline materials, particularly the preparation of polycrystals of boron nitride, by compressing a mixture containing boron nitride of wurtzite form with a high level of defects, as one of the components. Materials formed have a broad application, principally for providing cutting tools. DOE

N82-30114# California Univ., Berkeley. Lawrence Berkeley Lab. Materials Science and Mineral Engineering Dept.
MORPHOLOGY OF GRAIN-BOUNDARY SEGREGATION: EFFECT OF GRAIN-BOUNDARY STRUCTURE IN Al-Zn ALLOYS Ph.D. Thesis
Jose Mauro BricenoValero Nov. 1981 112 p refs Sponsored in part by Univ. de Los Andes
(Contract W-7405-eng-48)
(DE82-010341; LBL-13626) Avail: NTIS HC A06/MF A01

A high spatial resolution study of the behavior of Zn solute in Al bicrystals was conducted using X-ray energy-dispersive spectroscopy (EDS) in a TEM/STEM instrument. The effects of relative crystal orientation were studied in order to establish the relatonship between the crystallography and structure of high angle grain boundaries and grain boundary segregation phenomena. It was observed that both structure and heat treatment affect the ddistribution of solute at the grain boundary. Specimens subjected to short annealing cycles were found to exhibit a periodic distribution of Zn along the grain boundary plane prior to the appearance of any evidence suggesting precipitation had occurred. The periodicity of the segregation event was found in several cases to agree with the expected intervals of atomic relaxations in the O-lattice. DOE

N82-30115# Sao Paulo Univ. (Brazil). Inst. de Fisica.
ISING MODEL WITH COMPETING AXIAL INTERACTIONS IN THE PRESENCE OF A FIELD
C. S. O. Yokoi, S. R. A. Salinas (Federal de Pernambuco Univ.), and M. D. Coutinho-Filho Sep. 1980 60 p refs
(DE82-70094; IFUSP-2-239) Avail: NTIS (US Sales Only) HC A04/MF A01; DOE Depository Libraries

A layered Ising model is studied with competing interactions between nearest and next-nearest layers in the presence of a magnetic field. The analysis is carried out in the mean-field approximation with one effective field for each layer. The high temperature region is studied analytically. The low temperature region is studied numerically. T-H phase diagrams are constructed which exhibit a variety of modulated phases for various values of the ratio of the strength of the competing interactions. Numerical evidence of the devil's staircase behavior is found either as a function of temperature or applied magnetic field. DOE

N82-30116# Los Alamos Scientific Lab., N. Mex.
VACANCY BEHAVIOR IN A COMPRESSED FCC LENNARD-JONES CRYSTAL
Joe R. Beeler, Jr. (North Carolina State Univ., Raleigh) Dec. 1981 79 p
(Contract W-7405-eng-36)
(DE82-007054; LA-9121-MS) Avail: NTIS HC A05/MF A01

The stable vacancy configuration in a compressed fcc Lennard-Jones crystal and the migration of this defect in a compressed crystal were determined. The isotropic and uniaxial compression magnitudes employed were 0.94 < or = to eta < or = to 1.5, and 1.0 < or = to eta < or = to 1.5, respectively. The site-centered vacancy (SCV) was the stable vacancy configuration whenever cubic symmetry was present. This includes all of the isotropic compression cases and the particular uniaxial compression case that give a bcc structure. In addition, the SCV was the stable configuration for uniaxial compression eta < 1.29. The out of plane split vacancy (SV-OP) was the stable

vacancy configuration for uniaxial compression 1.29 < eta < or = to 1.5 and was the saddle point configuration for SCV migration when the SCV was the stable form. For eta < 1.20, the SV-OP is an extended defect and, therefore, a saddle point for SV-OP migration could not be determined. The mechanism for the transformation from the SCV to the SV-OP as the stable form at eta = 1.29 appears to be an alternating sign [101] and /or [011] shear process. DOE

N82-30117# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
PHOTO-INDUCED REACTIONS OF GASES ADSORBED ONTO SEMICONDUCTOR SURFACES Thesis
Roger Gladwin Carr Nov. 1981 101 p refs
(Contract W-7405-eng-48)
(DE82-010297; LBL-13479) Avail: NTIS HC A06/MF A01

Photodissociation of water adsorbed from the gas phase onto the platinized surface of SrTiO3 single crystals is shown to occur. In the temperature range from 375 to 475 K and in the presence of several atmospheres of water vapor, several thousands of monolayers of hydrogen produced from photodissociation of water were detected. Therefore the surface of SrTiO3 participated in the reaction as a catalyst, but not as a reactant. Attempts were made to synthesize methane from carbon dioxide and hydrogen, the latter being produced from photodissociation of water is above. The presence of carbon dioxide did not interfere with hydrogen production, but catalysts which promote methane synthesis were found to promote the back conversion of methane and water into hydrogen and carbon dioxide. Auger electron spectroscopy, ultraviolet photoelectron spectroscopy, and thermal desorption spectroscopy were used to examine the surfaces and adsorbates used in the preceding experiments. It was found that SrTiO3 which had no detectable Ti(3+) ions on the surface would adsorb water under the conditions of the earlier experiments. Hydroxylation of the surface of SrTiO3 was shown to increase its ability to adsorb carbon dioxide, and to promote the oxidation of carbon monoxide. DOE

N82-30118*# National Bureau of Standards, Washington, D.C. Center for Electronics and Electrical Engineering.
SEMICONDUCTOR TECHNOLOGY PROGRAM: PROGRESS BRIEFS Interim Report, 1 Apr. - 30 Jun. 1981
K. F. Galloway, R. I. Scace, and E. J. Walters Nov. 1981 13 p refs Sponsored in part NASA, Lewis Research Center, DOE, DNA, Charles Stark Draper Lab., NWSC, SERI and NOSC
(Contract N00030-79-C-0096; ARPA Order 3882)
(NASA-CR-169106; NAS 1.26:169106; PB82-135898; NBSIR-81-2230-3) Avail: NTIS HC A02/MF A01 CSCL 20L

Measurement technology for semiconductor materials, process control, and devices, is discussed. Silicon and silicon based devices are emphasized. Highlighted activities include semiinsulating GaAs characterization, an automatic scanning spectroscopic ellipsometer, linewidth measurement and coherence, bandgap narrowing effects in silicon, the evaluation of electrical linewidth uniformity, and arsenicomplanted profiles in silicon. GRA

N82-30023# Centro Studi e Laboratori Telecomunicazioni, Turin (Italy).
ALLOY SCATTERING MOBILITY AND ENERGY GAP EVALUATION BY THE DIELECTRIC MODEL IN LPE Ln(1-X)Ga(X)As(Y)P(1-7) SYSTEM
Domenico Campi, Claudio Papuzza, and Fulvio Taiariol *In its* Telecommun. Tech. Rept., Vol. 9, No. 6 Feb. 1981 p 599-604 refs (For primary document see N82-30018 20-70)
Avail: Issuing Activity

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

N82-30119# Texas A&M Univ., College Station. Dept. of Physics.
SEARCHING FOR THE GUT MONOPOLE
P. M. McIntyre and R. C. Webb 1 Feb. 1982 39 p refs Sponsored in part by the A. P. Sloan Foundation
(Contract DE-AS05-81ER-40039)
(DE82-011244; DOE/ER-40039/4) Avail: NTIS HC A03/MF A01

An underground search specifically optimized to detect super-heavy monopoles is proposed. Theoretical arguments pointing to the existence of magnetic monopoles are reviewed along with past attempts at detection. Requirements for a scintillation telescope are defined. The effects of monopole interactions with other particles are discussed. DOE

N82-30120# Los Alamos Scientific Lab., N. Mex.
ANALYSIS OF THERMODYNAMIC DATA FOR METHANE HYDRATES
Guy R. B. Elliott Jan. 1982 17 p refs
(Contract W-7405-eng-36)
(DE82-010843; LA-9035-MS) Avail: NTIS HC A02/MF A01

Data taken over nearly a century, which established pressure-temperature relationships for methane gas over solid methane hydrates, are not adequate to establish the thermodynamic relationships needed for engineering evaluations regarding the potential recovery of methane (natural gas) from natural deposits of solid hydrates. The problems lie in several areas: (1) equilibrium is hard to establish, and hysteresis is observed; (2) composition-pressure-temperature data are unavailable but are needed because the methane hydrates are (at least assumed to be) non-stoichiometric; (3) the data are not as precise as would be desirable; (4) accurate pressure-to-fuga-city corrections are not possible for the higher pressure data where the corrections become larger; and (5) the heat-capacity data are needed for evaluation of heats of reaction from pressures for the reaction solid-yields-liquid-plus-gas, but these data are not available except by estimation. It is recommended that better thermodynamic data for pressure-temperature-composition relationships (for example, by isopiestic balance) be evaluated. DOE

N82-30235 Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
THERMOCHEMICAL AND HEAT OF FORMATION DATA
C. Selph *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 307-313 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/13

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N82-30121*# Howard Univ., Washington, D. C. School of Engineering.
PREFRESHMAN AND COOPERATIVE EDUCATION PROGRAM
1976 5 p refs Sponsored by NASA
(NASA-CR-170423; NAS 1.26:170423) Avail: NTIS HC A02/MF A01 CSCL 05I

Of the 93 students enrolled in the PREFACE program over its four-year history, 70 are still in engineering school. Tables show profiles of student placement and participation from 1973 to 1977 (first semester completed). During the 1977 summer, 10 students were placed at NASA Goddard, 8 at DOE-Brookhaven, and 2 at American Can. Eleven students with less high school math preparation remained on campus for formal precalculus classes. Majors of the students in the program include civil, chemical, electrical, and mechanical engineering. Student satisfaction with their training experiences is summarized. A.R.H.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N82-30122# Committee on Science and Technology (U. S. House).

RISK ANALYSIS RESEARCH AND DEMONSTRATION ACT OF 1982

Washington GPO 1982 11 p Rept. to accompany H.R. 6159 presented by the Comm. on Sci. and Technol., 97th Congr., 2nd Sess., 24 Jun 1982

(H-Rept-97-625; GPO-89-006) Avail: US Capitol, House Document Room

Legislation to improve the use of risk analysis by those Federal agencies concerned with regulatory decisions related to the protection of human life, health, and the environment is reviewed. The purpose of the bill, implementation, program participants, demonstration projects, reports, research on risk analysis, committee views, analysis of the bill, and its impact on inflation are discussed. N.W.

N82-30123# American Psychological Association, Inc., Washington, D.C.

METHODOLOGICAL INNOVATIONS FOR STUDYING ORGANIZATIONS

1981 18 p refs

(Grant N00014-79-G-0074)

(AD-A113284) Avail: NTIS HC A02/MF A01 CSCL 05/1

Conducting research on complex organizations is a complex task. Social scientists studying organizations are faced with a number of specific challenges in carrying out high quality research. They include: collecting and then sharing qualitative data in ways that fit into a wider body of knowledge; phrasing research questions in ways more dictated by the significance of the issue, less by what other researchers are doing; picking strategies (such as a field experiment or survey methodology) on bases other than expediency or familiarity; making sense of patterns of results from a diverse set of studies conducted; designing and executing research to increase the chances that the finding will actually be used by decision makers in organizations; and using new, powerful quantitative analytic techniques appropriately. These methodological issues were addressed by a group of eighteen social scientists over a two year period. This brochure describes the results of this effort and tells how to obtain the materials that have been created. Author (GRA)

N82-30124# General Accounting Office, Washington, D. C. Mission Analysis and Systems Acquisition Div.

IMPROVING THE EFFECTIVENESS AND ACQUISITION MANAGEMENT OF SELECTED WEAPON SYSTEMS: A SUMMARY OF MAJOR ISSUES AND RECOMMENDED ACTIONS Report to the Congress

14 May 1982 127 p

(AD-A114628; GAO/MASAD-82-34) Avail: NTIS HC A07/MF A01 CSCL 05/1

Our review of 24 selected systems identified 71 issues, falling into two broad areas and 15 rather specific categories, which either have a direct bearing on the weapon systems' effectiveness or management of the acquisition program. These issues are not intended to represent all of the problems or questions associated with the weapon programs reviewed. The issue categories should also not be considered independently because some of the categories are very closely related. GRA

N82-30125# Harvard Univ., Cambridge, Mass. Computation Lab.

REAL TIME RESOURCE ALLOCATION IN A DISTRIBUTED SYSTEM

John H. Reif and Paul Spirakis Feb 1982 28 p refs Presented at the ACM AIGACT-AIGOPS Symp. on Principles of Distributed Computing, Ottawa, Aug. 1982

(Contract N00014-80-C-0647; Grant NSF MCS-79-21024)

(AD-A114856; TR-06-82) Avail: NTIS HC A03/MF A01 CSCL 05/1

A resource allocation problem is considered which is local in the sense that the number of users competing for a particular resource at any time instant is bounded and also at any time instant the number of resources that a user is willing to get is bounded. The problem may be viewed as distributedly achieving matchings in dynamically changing hypergraphs. We show that this problem is related to the fundamental problem of handshake communication (this problem can be viewed as achieving matchings in dynamically changing graphs, via distributed algorithms) in that an efficient solution to each of them implies an efficient solution to the other. We provide real-time solutions to the resource allocation problem (i.e., distributed algorithms with real time response) via probabilistic techniques. No probability assumptions about the system behavior are made, but processes are allowed the ability to make independent probabilistic choices. One of our solutions assumes the existence of an underlying efficient handshake communication system. Another is based on basic synchronization primitives (flag variables). The special case of equi-speed processes is examined. Applications are drawn to dining philosophers, scheduling and two-phase locking in databases. GRA

N82-30126# Federal Compiler Testing Center, Falls Church, Va. Federal Conversion Support Center.

CONVERSION CONTRACTING TECHNIQUES ASSOCIATED WITH PROCUREMENT OF A REPLACEMENT ADP HARDWARE SYSTEM Final Report

Sep. 1981 17 p

(PB82-145079; GSA/FCSC-81/003) Avail: NTIS HC A02/MF A01 CSCL 05A

Various procurement strategies for obtaining conversion services associated with the procurement of a replacement hardware system or timesharing service are discussed. Conversion associated costs are usually significant and must be considered when evaluating proposals for replacement hardware and teleprocessing services (FPR 1-4.1109-15). Five possible methods for procuring services with a hardware replacement are considered. GRA

N82-30127# Federal Compiler Testing Center, Falls Church, Va. Federal Conversion Support Center.

PREPARING SOFTWARE CONVERSION STUDIES Final Report

Jul. 1981 70 p

(PB82-142670; GSA/FCSC-81/002) Avail: NTIS HC A04/MF A01 CSCL 05A

A conversion study as required by FPR 1-4.1109-13 is a procurement planning document which should be conducted as early in the procurement cycle as possible, ideally, when it is determined that additional computing resources are required and that the most cost effective method of satisfying that requirement is to procure new or replacement hardware or teleprocessing support. The conversion study should be a major input in establishing the procurement strategy which has the lowest overall cost to the Government and encourages competition to the maximum extent practicable. An outline is presented that provides an agency with a suggested format and level of detail for each area of the conversion study, including sample forms and examples. GRA

N82-30128# Office of Personnel Management, Washington, D.C.

OFFICE AUTOMATION: AN IDENTIFICATION OF IMPLEMENTED TECHNOLOGIES Interim Report

Barbara A. Young Nov. 1981 27 p Presented at the Executive Session of the Federal Office Automation Conf., Washington, D.C., 4 Nov. 1981

(PB82-149337) Avail: NTIS HC A03/MF A01 CSCL 05A

Technology that was applied in the Federal sector and practical applications that can be shared with the entire Federal community are identified. Ways that integrate office systems can enhance and broaden the capabilities of office workers and provide for a more effective federal workforce are examined. Organizations which have successfully implemented the integrated office concept, utilizing electronic mail, work processing, micrographics and reprographics are identified. GRA

N82-30129# Science and Technology Agency, Tokyo (Japan).

A SUMMARY OF FY 1980 WHITE PAPER ON SCIENCE AND TECHNOLOGY IN JAPAN: INTERNATIONAL

COMPARISONS AND FUTURE TASKS
Jul. 1981 25 p
(PB82-161456; W-81-8) Avail: NTIS HC A02/MF A01 CSCL 05A

The strength, potential and special features of the advanced countries and their relative positions in the fields of science and technology were compared. Policy measures and strategies adopted by the major advanced countries for promoting science and technology are dealt with. Trends in activities of science and technology, and policy measures taken by the Japanese Government are summarized. GRA

N82-29636# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
HISTORY AND TASKS OF THE PERMANENT COMMITTEE ON GEOGRAPHICAL NAMES (PCGN) [GESCHICHTE UND AUFGABEN DES STAENDIGEN AUSSCHUSSES FUER GEOGRAPHISCHE NAMEN (StAGN)]
Josef Breu *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 7-14 refs In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)
Avail: NTIS HC A05/MF A01

N82-30152# European Space Research and Technology Center, Noordwijk (Netherlands). Space Science Dept.
SCIENTIFIC ORGANIZATION OF THE HIPPARCOS PROJECT
M. A. C. Perryman *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 31-38 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30241*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MANAGEMENT AND DEVELOPMENT OF LOCAL AREA NETWORK UPGRADE PROTOTYPE
T. J. Fouser *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1981 p 14-19 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 05A

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N82-30130* National Aeronautics and Space Administration, Washington, D. C.
A GUIDE TO RESEARCH IN NASA HISTORY
Alex Roland Aug. 1982 54 p refs
(NASA-TM-84823; NAS 1.15:84823) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, Baltimore/Washington International Airport, Md. 21240 CSCL 05B

The NASA history program is reviewed. Headquarters and NASA Centers resources are discussed. Research in contemporary published records of the Federal government is also discussed. Resources at the Johnson and Kennedy Space Center are summarized. N.W.

N82-30131*# Council of State Governments, Lexington, Ky.
PILOT STUDY OF THE DOMESTIC INFORMATION DISPLAY SYSTEM IN STATE AND LOCAL GOVERNMENT Final Report
Mar. 1982 42 p refs
(Contract NASw-3368)
(NASA-CR-169191; NAS 1.26:169191) Avail: NTIS HC A03/MF A01 CSCL 05B

An interactive computer based system that can retrieve a wide range of data (demographic, environmental, socio-economic, etc.,) from a large data base and display these data for different geographic units in the form of choropleth maps was developed. The system was designed to display statistical information in a geographic format for national policy makers. S.L.

N82-30132# ADR Services, Inc., Vienna, Va.
DARCOM MARDIS SUPPORT PROJECT Final Report, 1 May 1980 - 30 Apr. 1982
31 Mar. 1981 21 p
(Contract DAAK21-80-C-0045; DA Proj. 1P6-65803-M-720)
(AD-A114022; ADRSI-02113) Avail: NTIS HC A02/MF A01 CSCL 05/2

Major efforts accomplished were processing data, maintaining all files, logs and records, producing reports, preparing periodic and special reports, writing computer programs, establishing written operating procedures, recommending corrections or improvements, and providing assistance to activities involved with the MARDIS system. Author

N82-30133# Calculon Corp., Rockville, Md.
RECORDS FILING, MAINTENANCE AND DISPOSITION STUDY FOR DEPARTMENT OF THE ARMY. AN ANALYSIS OF TAFFS, THE ARMY FUNCTIONAL FILES SYSTEM Final Report, 1 Oct. 1980 - 30 Sep. 1981
John R. Maher 30 Sep. 1981 140 p refs
(Contract MDA903-80-C-0271)
(AD-A107079) Avail: NTIS HC A07/MF A01 CSCL 05/2

The Army Functional File System (TAFFS) should be replaced because it (1) is not automatable, (2) has major faults as a manual system (mainly its lack of management support characteristics), and (3) is not a good wartime system. In replacing TAFFS a simpler more management oriented manual system for interim use should be used. The first order of business is to develop a simpler information classification system. Two groups of subsystems and concepts are recommended; one group (Test A), conservative based on a simplified TAFFS and the second (Test B), more innovative based on a long standing Army subjective system used to classify and number Army Regulation. A number of concepts are included in Test B which improve system management support characteristics and which are also automatable. GRA

N82-30134# Defense Technical Information Center, Alexandria, Va.
SOURCE HEADER LIST. VOLUME 1: A THROUGH K Report for period ending 8 Apr. 1982
James P. Burrell, comp. Apr. 1982 496 p Supersedes DTIC/TR/81/2 2 Vol.
(AD-A115000; DTIC/TR/82/1-Vol-1; DTIC/TR/81/2) Avail: NTIS HC A21/MF A01 CSCL 05/2

This publication is a two volume, alphabetically arranged, compilation of source names used by the Defense Technical Information Center (DTIC). Each source name is assigned a 6-digit numeric code for computer input and retrieval purposes, plus a 4-digit alphanumeric geopolitical code and an alphanumeric type code. Source names displayed are included as data elements in the Technical Report, Work Unit Information System, Research and Development Program Planning, and Independent Research and Development data bases maintained by DTIC. These volumes replace the DTIC Source Header List, dated January 1981 (AD-A094000). Author (GRA)

N82-30135# Defense Technical Information Center, Alexandria, Va.
SOURCE HEADER LIST. VOLUME 2: L THROUGH Z Report for period ending 8 Apr. 1982
James P. Burrell, comp. Apr. 1982 413 p Supersedes DTIC/TR/81/2 2 Vol.
(AD-A115001; DTIC/TR/82-2-Vol-2; DTIC/TR/81/2) Avail: NTIS HC A18/MF A01 CSCL 05/2

This publication is a two volume, alphabetically arranged, compilation of source names used by the Defense Technical Information Center (DTIC). Each source name is assigned a 6-digit numeric code for computer input and retrieval purposes plus a 4-digit alphanumeric geopolitical code and an alphanumeric type code. Source names displayed are included as data elements in the Technical Report, Work Unit Information System, Research and Development Program Planning, and Independent Research and Development data bases maintained by DTIC. These volumes

replace the DTIC Source Header List, dated January 1981 (AD-A094001). Author (GRA)

N82-30136# R and D Associates, Arlington, Va.
SUGGESTED CHANGES IN THE DEPARTMENTAL REVIEW PROCESS TO IMPROVE ENERGY TECHNOLOGY BASE MANAGEMENT Final Technical Report, Oct. 1980 - Apr. 1981
Joel Bengston, Robert B. Davidson, and H. W. Hevert Apr. 1981 52 p
(Contract DE-AC01-80ER-30005)
(DE82-004929; DOE/ER-30005/T1; RDA-TR-116500-001) Avail: NTIS HC A04/MF A01

The DOE procedures for technology base planning and assessment are reviewed. On the basis of this review, two recommendations for improved procedures are made. First, DOE should develop the capability to establish, maintain, and use a comprehensive, current inventory of technology base activities. Second, DOE should develop means for describing technology base plans and activities within DOE R and D programs in a way which is suitable for use in Department-wide review of the energy technology base. DOE

N82-30137# Science Applications, Inc., Englewood, Colo.
BETC INFORMATION MANAGEMENT SYSTEM WITH FOCUS ON ROS ESTIMATION Final Report
J. K. Willoughby, J. A. Gardner, S. B. Heath, and M. A. Kehler Dec. 1981 39 p refs
(Contract DE-AC19-79BC-10032)
(DE82-004695; DOE/BC-10032/43) Avail: NTIS HC A03/MF A01

A special purpose information data base system was designed to support the technical staff in the areas of enhanced oil recovery (EOR) and residual oil saturation estimation (ROS). It is revealed that four basic data types most often required by potential system users are: (1) numeric files; (2) bibliographic citations and abstracts; (3) project information such as schedules and budgets; and (4) reference to persons that are authorities in various relevant topical areas. The need for a unique subject taxonomy and for four different data types resulted in the design of a system that permits the retrieval of information by searching the subject taxonomy, selecting a subject term, or terms, and determining the appropriate data types in one step searching. To accommodate a diverse user group, the system incorporates a range of man/machine interface features including both menu selection and command language capabilities. A numeric and bibliographic production system was implemented and data are loaded, a citation template is developed, and guidelines for a data base administration function within the Center are developed. DOE

N82-30138# California Univ., Livermore. Lawrence Livermore Lab.
EVALUATED NUCLEAR DATA LIBRARY
R. J. Hoverton, R. E. Dye, and S. T. Perkins 8 Oct. 1981 41 p refs
(Contract W-7405-eng-48)
(DE82-007734; UCRL-50400-Vol-4-Rev-1) Avail: NTIS HC A03/MF A01

The Lawrence Livermore National Laboratory (LLNL) collection of evaluated data for neutron-, photon-n and charged-particle-induced reactions is maintained in a computer-oriented system. The history of Evaluated Nuclear Data Library, the methods of evaluation, and examples of input and output representation of the data are provided. DOE

N82-30139# Fiorello, Shaw and Associates, McLean, Va.
COST-BENEFIT ANALYSIS OF A FEDERAL INFORMATION PROCESSING STANDARD: COBOL (FIPS 21) IMPACTS ON AIR FORCE DATA SYSTEM DESIGN CENTER FUNCTIONS
Sep. 1981 88 p refs Prepared in cooperation with Aurora Associates, Inc.
(Contract NBS-CA-0405)
(PB82-140245; NBS-GCR-81-262) Avail: NTIS HC A05/MF A01 CSCL 09D

The economic costs and benefits of a selected Federal Information Processing Standard (FIPS) which has been implemented by Federal agencies are defined and evaluated. A cost-benefit analysis framework for the post-implementation evaluation of a FIPS is demonstrated. This framework should provide guidance for future post-implementation analyses of FIPS. GRA

N82-29637# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
CONSIDERATIONS ON PHONETIC TRANSCRIPTION IN A GEOGRAPHIC GAZETTEER OF THE WORLD [UEBERLEGUNGEN ZUR AUSSPRACHE-NOTIERUNG IN EINEM GEOGRAPHISCHEN NAMENBUCH DER ERDE]
Otto Back *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 83 1981 p 15-20 refs In GERMAN; ENGLISH summary (For primary document see N82-29635 20-42)
Avail: NTIS HC A05/MF A01

N82-29654# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
DATA MEMORY FOR RAPID ACCESS TO DATA ON SPACE-ADJACENT OBJECTS [DATENSPEICHERUNG FUER SCHNELLEN ZUGRIFF AUF DATEN RAEUMLICH BENACHBARTER OBJEKTE]
Andre Frank *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 37-47 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29656# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TOWARDS APPLICATION OF COMPUTER OUTPUT ON MICROFILM (COM) TECHNOLOGY IN COMPUTER ASSISTED MAP PRODUCTION [ZUR ANWENDUNG DER COM-TECHNIK BEI DER RECHNERGESTUETZTEN KARTENHERSTELLUNG]
Dietmar Gruenreich *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 53-66 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29659# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE GEOSCIENTIFIC DATA BANK SYSTEM, DASP [DAS GEOWISSENSCHAFTLICHE DATENBANKSYSTEM DASP]
Klaus Kuehne *In its* Repts. on Cartography and Geodesy. Ser. 1: Original Repts., No. 85 1981 p 83-98 refs In GERMAN; ENGLISH and FRENCH summaries (For primary document see N82-29649 20-42)
Avail: NTIS HC A08/MF A01

N82-29670# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPRODUCTION AND PRINTING AT THE BERLIN BRANCH OFFICE [REPRODUKTION UND DRUCK IN DER AUSSENSTELLE BERLIN]
Juergen Hoffmann *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 86 1981 p 61-79 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

N82-29671# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
SALE OF MAPS AND PUBLICATIONS OF THE INSTITUTE FOR APPLIED GEODESY [VERTRIEB DER KARTEN UND VEROEFFENTLICHUNGEN DES INSTITUTS FUER ANGEWANDTE GEODAESIE]
Edelgard Feist *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 86 1981 p 81-83 In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42
Avail: NTIS HC A06/MF A01

N82-29672# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
SCALE 1 : 1,000,000 DIGITAL CARTOGRAPHIC DATA

BANK FOR THE FEDERAL REPUBLIC OF GERMANY [DIGITALE KARTOGRAPHISCHE DATENBANK 1 : 1,000, 000 FUER DIE BUNDESREPUBLIK DEUTSCHLAND]
Ernst-Ulrich Fischer and Helmut Uhrig *In its* Rept. on Cartography and Geodesy. Ser. 1: Original Rept., No. 86 1981 p 85-100 refs In GERMAN Original contains color illustrations (For primary document see N82-29664 20-42)
Avail: NTIS HC A06/MF A01

N82-30159# Technische Universitaet, Darmstadt (West Germany). Inst. of Physical Geodesy.
GEODETIC APPLICATIONS OF HIPPARCOS RESULTS
E. Groten *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 71-73 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30176# Lausanne Univ. (Switzerland). Inst. d'Astronomie.
GROUND-BASED PHOTOMETRIC DATA
J.-C. Mermilliod and M. Mermilliod *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission p 139-141 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30193# Observatoire de Paris (France).
THE HIPPARCOS ASTROMETRY PROGRAM CATALOG AND GROUND-BASED ASTRONOMY [CATALOGUE HIPPARCOS ET OBSERVATIONS AU SOL]
F. Chollet and S. Debarbat *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 223-225 refs In FRENCH (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N82-30140# Committee on Appropriations (U. S. House).
NATIONAL AERONAUTICS AND SPACE ADMINSTRATION
Washington GPO 1981 51 p Hearings before the Subcomm. on HUD-Independent Agencies of the Comm. on Appropriations, 97th Congr., 6 Apr. 1981
Avail: Subcommitee on HUD-Independent Agencies
Testimony regarding NASA's proposed fiscal year 1981 reprogramming, and the President's proposed rescession and reduction in pay supplemental appropriation request are discussed. The impact of budget changes on the space shuttle and Galileo projects are discussed. R.J.F.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N82-30141*# National Aeronautics and Space Administration, Washington, D. C.
SPINOFF 1982
James J. Haggerty Apr. 1982 134 p Original contains color illustrations
(NASA-TM-84826; NAS 1.15:84826) Avail: NTIS MF A01; SOD HC $7.50 CSCL 05A
NASA aerospace activities are reviewed. Adaptation of aerospace technology by private firms and public sector organizations is emphasized. Areas include transportation, consumer and recreational products, computer technology, health and medicine. Industrial productity, environment and public safety, commercial remote sensing, and technology demonstrations. N.W.

N82-30142# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research Div.
CHARACTERIZATION OF THE DYNAMIC ROADWAY-POWERED ELECTRIC-VEHICLE SYSTEM
J. D. Salisbury, D. Mullenhoff, and C. E. Walter 30 Oct. 1981 22 p ref
(Contract W-7405-eng-48)
(DE82-007149; UCID-19272) Avail: NTIS HC A02/MF A01
Measurements were made to characterize the losses in the roadway and the pickup of the dynamic RPEV system. By analysis of power, voltage, current and impedance bridge measurements (at 100 Hz and 1000 Hz), the equivalent series resistance (ESR) and equivalent parallel resistance (EPR) of the roadway and pickup inductances and capacitances were derived. Separation of the inductive and capacitive losses was difficult because of the large ratio of stored energy to power loss, that is, the Q of each of these system elements, and the separation was accomplished by modeling the system losses and making a least squares fit to the model with the test data. The bridge data was used primarily for capacitance and inductance values. DOE

N82-30143# Reuyl (John S.) Associates, Palo Alto, Calif.
SIMULATIONS OF THE ENERGY PERFORMANCE OF A SOLAR PHOTOVOLTAIC RESIDENCE AND HYBRID ELECTRIC AUTOMOBILE IN FRESNO, CALIFORNIA
John S. Reuyl and Randall D. Schutt Jan. 1982 132 p refs (Contract DE-AC04-76DP-00789)
(DE82-007563; SAND-81-7044) Avail: NTIS HC A07/MF A01
Thermal and electrical performance in both stand-alone and grid-connected configurations were simulated with computer models using actual hourly solar and weather data for Fresno, California. The system centers around an energy-efficient residence that incorporates passive heating and cooling. For the simulations, 110 square meters of GE photovoltaic shingle modules (9.6 kW(e) rated power), a 10 kW(e) dc-ac inverter, and advanced lead-acid batteries of 61 kWh(e) capacity were added to the residence. The auto has 30 kWh(e) of lead-acid batteries and a 40-hp electric drive motor for propulsion. The auto was assumed to travel 100 km (62 miles) each day (36,500 km (22,680 miles) annually). A small (10 kW(e) backup liquid-fueled engine/generator in the auto provides supplemental electricity on cloudy days and for long-distance travel. The utility would provide backup electricity for the residence, or the auto engine/generator can provide this backup power to the residence as well as so-called waste heat from the engine for space heating and domestic hot water. DOE

N82-30144# Northwestern Univ., Evanston, Ill. Transportation Library.
SOURCES OF INFORMATION IN TRANSPORTATION Final Report
Sep. 1981 287 p 2 Vol.
(Contract DOT-OST-60165)
(PB82-140765; DOT-RSPA-DPA-81-1) Avail: NTIS HC A13/MF A01 CSCL 05B
Basic references are provided on all modes of transportation, covering socioeconomic and technical aspects. Air transportation, railroads, shipping, inland water transportation, motor carriers, pipelines, highways and urban transportation are included. Basic references, statistical sources, directories, periodicals, conference proceedings, indexing and abstracting services and data bases, library accessions lists, dictionaries and glossaries, and bib-

liographies are presented. An author index is provided for the entire work. GRA

N82-30145# Northwestern Univ., Evanston, Ill. Transportation Library.
SOURCES OF INFORMATION IN TRANSPORTATION Final Report
Sep. 1981 280 p 2 Vol.
(Contract DOT-OST-60165)
(PB82-141433; DOT-RSPA-DP-81-1) Avail: NTIS HC A13/MF A01 CSCL 05B

Basic references on all modes of transportation are provided. Socioeconomic and technical aspects are covered with emphasis on U.S. sources. Multimodal, air, railroads, shipping, inland water transportation, motor carriers, pipelines, highways and urban transportation are considered. Basic references, statistical sources, directories, periodicals, conference proceedings, indexing and abstracting services and data bases, library accessions lists, dictionaries, and glossaries, and bibliographies are cited. An author index is provided for the entire work. GRA

88 SPACE SCIENCES (GENERAL)

N82-30146# European Space Agency, Paris (France).
THE SCIENTIFIC ASPECTS OF THE HIPPARCOS SPACE ASTROMETRY MISSION
M. A. C. Perryman, ed. and T. D. Guyenne, ed. May 1982 250 p refs Partly in ENGLISH and FRENCH Conf. Proceedings of Intern. Colloq., Strasbourg, France, 22-23 Feb. 1982; sponsored by ESA, Copenhagen Univ. Observatory, Observatoire de Strasbourg, France and the Inst. Nationale d'Astronomie et Geophysique
(ESA-SP-177) Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

A satellite astrometry project involving more than 100,000 stars was discussed. Proper motions, positions, and parallaxes are obtained. Inertial reference systems, mission design, and data analysis were considered. Photometric aspects, double/multiple star systems, and ground based activities were considered. For individual titles, see N82-30147 through N82-30193.

N82-30147# European Space Agency, Paris (France).
THE SPACE ASTROMETRY PROJECT: HISTORY, TECHNICAL EVOLUTION AND FUTURE PROSPECTS
P. Lacroute *In its* The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 3-12 refs In ENGLISH and FRENCH (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

A plan to provide coordinates of 400,000 stars of magnitude 10 to 12 with uncertainties from 0.02 to 0.06 arcsec is outlined. The B and V magnitudes are estimated with uncertainties from 0.02 to 0.06 mag, color indices with uncertainties from 0.03 to 0.10 mag. Data are collected by the Hipparcos satellite, scanning the sky, under permanent active attitude control. The reference system is derived from angular measurements. Satellite attitude motion is deduced from transit time data of reference stars. Star position is derived from a combination of satellite attitude data and transit times. Data smoothing techniques and equipment modifications which improve accuracy are discussed. Author (ESA)

N82-30148# Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
THE SATELLITE HIPPARCOS **c89**
J. Kovalevsky *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 15-20 ref (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

An astrometry satellite is described. Constraints to be taken into account in observation programs are outlined. A complex mirror with two plane surfaces directs two fields into a single telescope. The two images are superimposed on a grid on the focal surface of the telescope. Sources of measurement error include: random signal instabilities; insufficient modelling of the instrument; attitude uncertainty; and photon statistics. For observation programs, stars between Cassiopeia and Aquila, or Centauris and Canis Major are preferable. Faint stars have a maximum chance of getting more time if the absolute value of their ecliptic latitude exceeds 50 deg. If possible, avoid the galactic plane when choosing stars for their physical characteristics; do not expect to have more than four stars/sqdeg; and indicate on lists of stars what could be omitted. Author (ESA)

N82-30149# Copenhagen Observatory (Denmark).
TYCHO: A PLANNED ASTROMETRIC AND PHOTOMETRIC SURVEY FROM SPACE **c89**
E. Hoeg, C. Jaschek (Centre de Donnees Stellaires, Strasbourg, France), and L. Lindegren (Lund Obs., Sweden) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 21-25 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The use of the Hipparcos satellite star mappers (originally intended for attitude control) to collect data on 400,000 stars brighter than B=11 mag is described. By fitting the star mappers with B and V color fitters, positional accuracy of 0.03 arcsec and 0.03 mag for B and V magnitudes are feasible. In a 2.5 yr mission, 90 position observations, and 45 magnitude observations can be obtained for an average star. Magnitude data can be used to study variables. While only 20,500 variables of all magnitudes are recorded in 1969 catalogs, at least 33,000 of magnitude brighter than V=10 are predicted for Tycho. The experiment is very cost efficient compared with ground based astrometry; the equivalent of 5000 man years for meridian observations and 500 for astrographic observations are obtained for 10 man years of data reduction. Author (ESA)

N82-30150# Copenhagen Observatory (Denmark).
PROPOSED ULTRAVIOLET OBSERVATIONS WITH TYCHO **c89**
E. Hoeg *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 27-28 ref (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The introduction of an ultraviolet slit with U filter into the Hipparcos satellite star mappers, as part of the Tycho experiment, is proposed. Tycho uses star mapper data to observe 400,000 stars brighter than B-11, with accuracy at B = 10 of 0.03 arcsec for position and 0.03 mag for B and V magnitudes. A slit of width 10 arcsec, 20 arcmin length, perpendicular to scan direction is assumed. This gives observing time of 0.067 sec per star mapper passage, and 3 sec total observing time for the 30 month mission. Accuracy at B = 10 of 0.08 mag for spectral types BO and AO to GO is predicted. Author (ESA)

N82-30151# European Space Agency, Paris (France).
THE HIPPARCOS PROGRAM [LE PROGRAMME HIPPARCOS] **c90**
P. Lacroute *In its* The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 29-30 In FRENCH; ENGLISH summary (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The effects of dynamic smoothing of attitude data on the Hipparcos satellite observation program are summarized. Smoothing can be used either to increase homogeneity of results or to improve results for given stars. The latter is advocated, since homogeneity without smoothing is sufficient for applications of the results. Greater weight should thus be given to the relative accuracy of parallaxes in order to calibrate each spectral type. Proper motions can be used to eliminate systematic errors in present catalogs. The Tycho experiment (which uses satellite attitude control star mappers for astrometry) can be used to increase the number of reference stars for photographic work. Author (ESA)

N82-30152# European Space Research and Technology Center, Noordwijk (Netherlands). Space Science Dept.
SCIENTIFIC ORGANIZATION OF THE HIPPARCOS PROJECT **c81**
M. A. C. Perryman *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 31-38 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Guidelines for proposals to the Hipparcos project are outlined and the compilation of the input catalog is described. Data analysis and links to other reference frames are discussed. Stars observed must be defined before launch. Coordinates must be known with an a priori accuracy within 1.5 arcsec rms in each coordinate at the epoch of observation. Stars must be distributed uniformly over the celestial sphere. Satellite data are processed by two independent consortia, who construct the final catalog. The catalog coordinate system is derived from a ground based system, e.g., FK5, or a quasi-inertial system. Author (ESA)

N82-30153# Astronomische Rechen-Institut, Heidelberg (West Germany).

DETERMINATION OF POSITIONS AND THE REFERENCE SYSTEM c90

W. Fricke *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 43-47 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The history of star position determination is reviewed and absolute and differential observations for the construction of the FK5 reference system are discussed. The relation between spaceborne and ground based observations is considered. With respect to FK4, the introduction of the IAU (1976) general precession value changes proper motions, but does not change positions except for higher order effects. The FK5 equinox necessitates additions to proper motions in right ascension of FK4 at 1950.0. Absolute and quasi-absolute observations indicate that zonal corrections are needed. Strong oscillation near the south pole is reported. The FK5 mean places do not include E-terms of aberration. These are included in reduction to apparent places. Computation of apparent places includes relativistic effects and nutation theory. The standard epoch and equinox are J 2000.0. Author (ESA)

N82-30154# Hamburger Sternwarte (West Germany).

ON THE IMPORTANCE OF THE HIPPARCOS STELLAR NET FOR PHOTOGRAPHIC CATALOG WORK c35

C. deVegt *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 49-52 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The improvement in overall accuracy of ground based photographic catalogs, made possible by the error free reference points of the Hipparcos satellite, is discussed. Hipparcos data can be used to correct systematic errors in existing catalogs, and combined satellite-ground data can be used to construct the reference frame for a given epoch. Ground data, reduced using Hipparcos references, can provide proper motions for all stars down to magnitude 13, with mean error = 2 mas/yr. Data on several 100,000 stars are expected, allowing a global extragalactic reference frame to be established. Author (ESA)

N82-30155# Cambridge Univ. (England). Inst. of Astronomy.

THE SELECTION OF STARS FOR LINKING THE HIPPARCOS FRAME TO EXTRAGALACTIC RADIO SOURCES BY SPACE TELESCOPE Progress Report c93

A. N. Argue, R. D. Baxter, B. L. Morgan (Imperial Coll. of Science and Technology), and H. Vine (Imperial Coll. of Science and Technology) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 53-55 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Seventy-five radio sources south of declination + 5 deg were selected for an inertial reference frame, linking the Hipparcos frame to extragalactic objects, via the Space Telescope. Sources were chosen where there is no visible contamination of the image by any object closer than 15 arcsec. The astrometric properties of six stars were tested by speckle interferometry. Results show that one in three is binary on the scale 0.1 to 1.0 arcsec; none are eclipsing. Author (ESA)

N82-30156# Cambridge Univ. (England). Inst. of Astronomy.

REPORT BY INTERNATIONAL ASTRONOMICAL UNION COMMISSION 24 WORKING GROUP ON RADIO/OPTICAL ASTROMETRIC SOURCES FOR THE ESTABLISHMENT OF AN INERTIAL REFERENCE FRAME c89

A. N. Argue *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 57-59 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The use of radio interferometry, Hipparcos satellite, and Space Telescope data to construct an inertial reference frame for astrophysics and geophysics is discussed. Sources chosen have a starlike image with no structure, no companion within 2 arcsec, and no nebulosity to degrade optical measurement accuracy. No large scale structure exceeding 1 arcsec in the radio range above 1 GHz is accepted. An optically identified counterpart brighter than 18 mag is required to meet Space Telescope capabilities. The data base is overpopulated by a factor of 10. Extra data can be used to compare two catalogs, for example, even though the stars do not qualify as benchmarks.

Author (ESA)

N82-30157*# Texas Univ., Austin. Dept. of Astronomy.

FIDUCIAL REFERENCE FOR THE HIPPARCOS REFERENCE SYSTEM c90

D. Hemenway, W. H. Jeffreys, P. J. Shells, and R. L. Duncombe *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 61-63 ref (For primary document see N82-30146 20-88)

(Grant NAGw-233)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80 CSCL 03B

Means of determining the Hipparcos satellite instrumental system rotation and for tying Hipparcos system coordinates to a fundamental coordinate system are discussed. Observational characteristics requirements for radio sources and stars, for a Hipparcos-Space Telescope reference tie are given. Rotation of the Hipparcos system with respect to the extragalactic system can be derived from observations of the relative radial positions and motions of selected Hipparcos stars and quasi-stellar objects. Author (ESA)

N82-30158# Astronomische Rechen-Institut, Heidelberg (West Germany).

RADIO STARS AS CONNECTING LINK OF THE HIPPARCOS AND VERY LONG BASELINE INTERFEROMETRY (VLBI) REFERENCE FRAMES c90

H. G. Walter *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 65-68 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The use of radio star dual frequency emission to relate Hipparcos and VLBI reference frames is discussed. The physical basis of the connection is examined, using optical and radio data. Thirty stars brighter than magnitude 11 are identified as possible transfer stars, after applying brightness, angular separation, magnitude variation, and radio interferometric sensitivity criteria to 143 stars in the Wendker 1981 catalog. For six of the stars chosen, ground based optical observation of position and proper motion are needed to meet Hipparcos input catalog specifications. Author (ESA)

N82-30159# Technische Universitaet, Darmstadt (West Germany). Inst. of Physical Geodesy.

GEODETIC APPLICATIONS OF HIPPARCOS RESULTS c82

E. Groten *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 71-73 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

A posteriori correction of classical geodetic data and improvement of current systems by Hipparcos satellite data are discussed. Hipparcos can improve geodetic systems by providing more accurate stellar data to supplement radio observations of polar motion. Improved stellar data could make regional astrogeodetic accuracy comparable to that of satellite techniques. For continental networks, orientation is improved to a greater extent by astrogeodetic data than by satellite (e.g., Doppler) data. Processing of Hipparcos data can include collocation techniques in addition to adjustment of correlated observations.

Author (ESA)

N82-30160# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.

HIPPARCOS PROPER MOTIONS **c90**

R. Wielen *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 77-82 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The expected accuracy and number of Hipparcos proper motions are compared with ground based measurements. The use of these motions to investigate galactic kinematics and evolution is discussed. Hipparcos accuracy is as good as FK 4 and FK 5, and Hipparcos covers many more, and fainter, stars. Hipparcos particularly improves individual errors in the southern sky. For very small areas, e.g., < 1 deg X 1 deg, ground or space telescopes are more accurate than Hipparcos. Hipparcos systematic accuracy is better than that of ground based fundamental systems. Applications of Hipparcos proper motions include the provision of reference stars for photographic astrometry, calculation of stellar orbits, computation of stellar birthplaces, and determination of galactic rotation. Author (ESA)

N82-30161# Stockholm Observatory (Sweden).

GALACTIC STRUCTURE RESULTS DERIVED FROM STUDIES OF LOCAL KINEMATICS **c90**

K. Loden *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 83-84 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The use of Hipparcos satellite radial velocity, proper motion, and distance data to extrapolate galactic dynamics and structure from local stellar kinematics is suggested. Gradients of radial and tangential velocities of stars with respect to distance, and their dependence on galactic longitude can be derived from observations. These gradients can be compared with theoretical models of the velocity field, providing, e.g., more knowledge about star formation and spiral structure. Author (ESA)

N82-30162# Royal Observatory, Edinburgh (Scotland).

THE ROLE OF EARLY TYPE STARS IN STUDIES OF GALACTIC DYNAMICS **c90**

S. V. M. Clube *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 85-87 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The importance of further measurements of the proper motions of early stars out to several kiloparsecs is emphasized. Radial velocity and photographic parallax data of stars within 2 kiloparsecs do not resolve the conflict between the Schwarzchild ellipsoidal hypothesis and Kapetyn's drift hypothesis. Analysis indicates group motions towards the third and fourth quadrants of galactic longitude, supporting the drift hypothesis. However, results merely reflect a highly schematic declineation of the spiral arms and distances of the stars, with typical errors no better than + or - 30%. Hipparcos satellite measurements are expected to provide an ultimate test of the hypotheses. Author (ESA)

N82-30163# Observatoiie de Meudon (France).

A COMPARISON OF B AND Be STAR KINEMATICS **c90**

D. Briot *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 89-90 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Hypotheses, concerning the evolutionary stage of Be stars of luminosity class 8 to 5, are reviewed and a plan for differentiating the ages of B and Be stars is proposed. Hypotheses are: that the Be stage corresponds to a post main sequence stage of B star evolution; that the Be stage preceeds the nonemission B stage; and that the Be aspect is a temporary variation of the B star, without implying an evolutionary phenomenon. Determinations of proper motions by the Hipparcos satellite and of radial velocities by ground based observations are proposed. Spectral characteristics are to be studied from the ground, as is spatial distribution. Author (ESA)

N82-30164# Ruhr Univ., Bochum (West Germany). Astronomisches Inst.

ADVANTAGES, IMPLEMENTATION AND COST ESTIMATE OF A LONG-LIFE VERSION OF THE HIPPARCOS PAYLOAD **c90**

T. Schmidt-Kaler *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 91-92 (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Division of the Hipparcos satellite observation time into two 1.25 yr periods separated by a 5 yr shutdown is proposed. The planned 2.5 yr continuous program gives proper motions comparable to ground based observations. A long-life program gives proper motions three to four times more accurately. Parallax effects could be better separated from proper motion effects, with much lower systematic errors. Tie-in of asteroid orbits, and of the planetary system, to the Hipparcos inertial system would be improved. Reliability of binary star orbits, and the possibility of detecting planetary systems would be much higher. Implementation is feasible, using a slightly modified design, since components are inactive for most of the time. Author (ESA)

N82-30165# Kapteyn Astronomical Lab., Groningen (Netherlands).

TRIGONOMETRIC PARALLAXES: THE STELLAR CONTENT OF THE VOLUME OF SPACE COVERED BY HIPPARCOS AND SOME OF ITS ASTROPHYSICAL IMPLICATIONS **c90**

A. Blaauw *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 97-100 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The inventory of the stellar population within 100 parsec, brighter than apparent magnitude V = 11.0 is used to estimate the numbers of stars of various absolute magnitudes and spectral types in distance shells. How the Hipparcos parallax program for these stars provides a base for the calibration of luminosity criteria, for studies of the fine structure in the color-luminosity diagram, and for the use of highly accurate luminosities of individual stars is shown. Open clusters within reach of the parallax program and the determination of accurate stellar masses from visual double stars are discussed. Author (ESA)

N82-30166# Institut d'Astrophysique, Paris (France).

ABSOLUTE MAGNITUDES AND OTHER BASIC PARAMETERS OF O AND B STARS **c89**

L. Divan and J. Zorec *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 101-104 refs Prepared in cooperation with College de France, Paris (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The parameters lambda 1 and D of the BCD system are calibrated in effective temperature and bolometric magnitude for O and B stars. Lambda is a parameter linked to the position of the Balmer discontinuity; D is the value of this discontinuity. Verification and/or improvements expected from Hipparcos parallaxes are discussed. The difference between the bolometric and visual absolute magnitude given by these calibrations is compared to the bolometric correction deduced from model calculations. General agreement is good except for late type B giants. For these, a number of Hipparcos parallaxes will be obtained with a precision large enough to find out the origin of this anomaly. Author (ESA)

N82-30167# Amsterdam Univ. (Netherlands). Inst. of Astronomy.

PARALLAXES FOR PRE-MAIN SEQUENCE HERBIG Ae/Be STARS **c90**

P. S. The and H. R. E. TjinADjie *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 105-106 refs (For primary document see N82-30146 20-88)

Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The use of the Hipparcos satellite to determine the distances of Ae/Be stars is proposed. Ground based spectroscopic parallaxes are often in error because they assume a luminosity class V, whereas pre-main sequence objects are above the main sequence. Hipparcos can obtain geometrical parallaxes with a factor of error much < 2. Data can be used to investigate the evolution of stable main sequence A and B stars, since Ae/Be stars are usually associated with T Tauri stars, and are located in dark cloud regions, data can be used to study these phenomena, which are too faint to be observed directly by Hipparcos.

Author (ESA)

N82-30168# Observatoire de Meudon (France).
STUDY OF ABSOLUTE MAGNITUDES OF B AND Be STARS **c89**
D. Briot and A. M. Hubert-Delplace *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 107-110 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Determination of Be star absolute magnitudes, and the role of the Hipparcos satellite in such determinations, are discussed. Problems include the difficulty of determining interstellar absorption and the effect of emissions on spectral classification and statistical studies. Neither luminosity class nor rotation account for Be magnitudes. The Be magnitudes could be greater than those of B stars because of energy redistribution in Be envelopes. Luminosity could be influenced by hot circumstellar zones (more important for Be than for B stars). The B-Be differences could be due to evolutionary factors, e.g., Be stars corresponding to a post main sequence stage of B stars. Homogeneous spectroscopic data, interstellar reddening measurements, and ground based investigation of emission spectra features and energy distribution of the envelope are advocated. Author (ESA)

N82-30169# Observatoire de Meudon (France).
ASTROPHYSICAL PARAMETERS FOR Ap AND Am STARS WITH HIPPARCOS **c89**
M. Gerbaldi (Inst. d'Astrophysique, Paris), D. Briot, C. Burkhardt (Obs. de Lyon), D. Egret (Obs. de Strasbourg), M. Floquet, A. Gomez, S. Grenier, B. Hauck (Lausanne Univ. Switzerland) C. Jaschek (Obs de Strasbourg), and M. Jaschek *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 111-113 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The advantages of Hipparcos data over classical methods of determining Ap and Am star magnitudes, radii, and kinematics, are pointed out. Statistical investigations of magnitude show the same general trend, but have large discrepencies when results are compared for different groups of stars. Hipparcos parallaxes will aid calibration of photometric indices in terms of magnitude. Radii can best be determined using the relation of the flux received on the Earth from a star whose emitted flux can be calculated using Hipparcos parallaxes. Hipparcos can provide proper motions for over 1000 Ap and Am stars, enabling their spatial distribution and kinematic properties to be compared with normal stars. Author (ESA)

N82-30170# Royal Greenwich Observatory, Herstmonceux (England).
TRIGONOMETRIC PARALLAXES FROM THE GROUND AND FROM HIPPARCOS **c90**
C. A. Murray *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 115-119 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The status of trigonometric parallax measurements and their statistical interpretation are reviewed. Detailed studies of the dependence on composition and age of the structure of the main sequence of stars brighter than magnitude V = 5.5, within 100 parsecs of the Sun are proposed. Hipparcos provides absolute parallaxes, avoiding uncertainties inherent in ground based techniques due to reduction from relative values. Stars can be chosen from the Michigan spectral survey, or by a criterion, such as proper motion, for areas not covered by the Michigan catalog. Parallaxes can be used to check the accuracy of cosmic distance indicators and to check luminosity calibrations. Author (ESA)

N82-30171# Observatoire de Lyon (France).
OBSERVATION OF SELECTED NEARBY COOL CARBON STARS (CCS) **c89**
J. Bergeat *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 121-122 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Ground based investigations of CCS are reviewed and the Hipparcos satellite, CCS observing program is outlined. The peculiar chemical composition of CCS makes spectral interpretation based on model atmospheres difficult and only one trigonometric parallax for CCS of temperature < 3000 K is available. The value of bolometric luminosity data is lessened by inhomogeneous sampling. Effective temperatures derived from photometry, and distances derived from proper motions and spectral energy distributions are fairly satisfactory, but Hipparcos can improve accuracy by up to a factor of 10. Hipparcos data are needed to investigate CCS mass range, and the amplitude of mass loss during the advanced stages of giant star evolution. The identification of carbon Miras with CCS of low mass envelopes can also be studied. Author (ESA)

N82-30172# Osservatorio Astronomico, Brera, Milan (Italy).
THE LUMINOSITY AND RELATED PARAMETERS OF VARIABLE AND NON-VARIABLE A, F STARS **c89**
E. Antonello, M. Fracassini, L. E. Pasinetti, and L. Pastori *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 123-124 refs Prepared in cooperation with Milan Univ. (For primary document see N82-30146 20-88)
(Contract CNR-N.81.00944.02)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The use of Hipparcos satellite trigonometric parallaxes to derive luminosity values of objects in the lower instability strip of the HR diagram is discussed. Data can be used to distinguish between variable and nonvariable normal stars. Distinctions which rely on rotational velocity, metallicsicm, and luminosity derived from photometry produce results in only 60% of cases. Often, e.g., for delta Scuti stars, results are negated because the assumed similarity with stars used for calibration is not valid. Author (ESA)

N82-30173# Observatoire de Paris (France).
HIPPARCOS AND THE DETERMINATION OF THE HELIUM CONTENT OF SOME LOW-MASS NONEVOLVED HALO AND DISK STARS OF THE SOLAR NEIGHBORHOOD, INFERRED FROM THE FINE STRUCTURE OF THE H-R DIAGRAM **c90**
M.-N. Perrin *In* ESA The Sci. Aspects of The Hipparcos Space Astrometry Mission May 1982 p 125-128 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

A method for determining the helium content of G and K stars is presented and improving its results, using Hipparcos data, is discussed. Stars are located using the absolute spectral energy distribution of the stellar flux received on Earth. Internal stellar structure computations dispense with the age parameter, i.e., only zero age main sequence stars are considered. Heavy element content is derived from atmosphere analysis. Results suffer from lack of data, e.g., only 40 disk star trigonometric parallaxes with accuracy > 5% are available. Dynamic masses, obtained from binary star orbital motions, using Hipparcos parallaxes, can be used to validate internal structure computations. Author (ESA)

N82-30174# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
PHOTOMETRIC ASPECTS OF TYCHO **c89**
C. Jaschek *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 133-135 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The coverage in sky surface and magnitude, and the accuracy of photometric survey catalogs are discussed. Knowledge of variable and eclipsing binary stars is reviewed. The use of broadband B and V filters for Tycho is advocated. Coverage is complete up to magnitude 9, but accuracy is very poor, with no homogeneous coverage in visual or photometric magnitude to within even 10% accuracy. Lack of accuracy makes the number of variables in surveys difficult to estimate. Tycho is expected to detect several dozen Cepheids and RR Lyrae, several hundred long-period variables, and several thousand short-period ones. Discoveries of eclipsing binaries, even in the magnitude range from 1 to 5, are predicted. Author (ESA)

N82-30175# Montpellier Univ. (France).
MIRA TYPE VARIABLE STARS AND THE IMPACT OF THE HIPPARCOS MISSION **c89**
M. O. Mennessier, J. Guibert (Obs. de Meudon, France), and Nguyen-Q-Rieu (Obs. de Meudon, France) *In* ESA The Sci.

Aspects of the Hipparcos Space Astrometry Mission May 1982 p 137-138 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The status of proper motion and parallax data on Mira stars is discussed and results expected from Hipparcos are considered. Relative photographic proper motions were measured for long period variables and reduced to absolute, FK3 system. Accuracy is on the order of 0.012 arcsec/yr. Trigonometric parallaxes with relative accuracy better than 100% are available for only 6 Miras. Hipparcos worst proper motion accuracies for stars of magnitude 13 located near the ecliptic plane are comparable to best ground based ones. From the mean luminosity curve, 300 Miras are observable during 70% to 100% of their cycle; 250 more are observable from 50% to 70%. Relative accuracy of parallaxes is better than 50% for 6 stars observable throughout their cycle, and between 50% and 100% for 10 more. Another 40, observable during part of their cycle can be examined. Magnitude variation effects on astrometric accuracy should be considered when preparing observation lists. Author (ESA)

N82-30176# Lausanne Univ. (Switzerland). Inst. d'Astronomie.
GROUND-BASED PHOTOMETRIC DATA c82
J.-C. Mermilliod and M. Mermilliod *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission p 139-141 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The photometric data base prepared at the Institut d'Astronomie de l'Universite de Lausanne is described in connection with the formation of the input catalog for the Hipparcos mission. The General Catalog of Photometric Data is presented. A test sample of 43,667 HD stars brighter than ptg = 8.5 is analyzed. About 54% of the stars in this sample have neither UBV nor uvby data. The proportion of available data per system is given for six photometries. More than half the stars measured by the Hipparcos satellite do not have the photometric data needed either for the input catalog or for interpretation of results. Author (ESA)

N82-30177# Lund Observatory (Sweden).
IMAGING PROPERTIES OF HIPPARCOS AND THE OBSERVATION OF MULTIPLE STARS c89
L. Lindegren *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 147-152 refs Sponsored by Swedish Board for Space Activities (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Image reconstruction from Hipparcos scans is discussed. Although the Hipparcos telescope is designed as a conventional optical imaging device, its combination with a modulating grid in the focal plane means that the whole instrument can be considered as a phase interferometer. Image reconstruction can exploit digital image processing techniques. Brightness distribution, for example, can be reconstructed using radio interferometry approaches to aperture synthesis. The possibility of detecting faint companions depends on the signal to noise ratio of the map obtained from the inverse transformations of sample points collected during the missions. Many binaries with separations in the interval from 0.05 to 0.5 arcsec could be discovered by Hipparcos. Author (ESA)

N82-30178# Lille Univ. (France).
CHARACTERISTICS OF DOUBLE STARS OBSERVABLE BY HIPPARCOS [CARACTERISTIQUES DES ETOILES DOUBLES OBSERVABLES PAR HIPPARCOS] c89
P. Baachus *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 153-159 refs In FRENCH (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Conditions which double stars must fulfill in order to be astronometrically observable by Hipparcos are determined. Characteristics of known double stars which Hipparcos can determine are considered. The probability of binary stars being recognized as such after data processing is discussed. Methods for determining position, proper motion, and parallax of stars recognized as double are given. With maximum separation of 5 arcsec between the two components if the telescope is trained on one of them, and 10 arcsec if it is pointed between them, 40% of double stars with known orbits can be observed. Author (ESA)

N82-30179# Belgian Royal Observatory, Uccle.
THE INTEREST OF DOUBLE STAR OBSERVATIONS BY HIPPARCOS c89
J. Dommanget *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 161-164 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The inclusion of binary stars in the Hipparcos input catalog, given the criterion that candidates must have a perfectly symmetrical circular image, is discussed. Many binaries have component separation which allow them to be systematically observed without disturbing the main project. Only those with separations between 5 and 20 arcsec need be rejected. Total mass of visual orbital pairs can be determined with an accuracy on the order of + or - 25% for 174 objects, using Hipparcos parallaxes. Knowledge on the genesis and evolution of binaries can be obtained from the parallaxes of nonorbital visual pairs. Proper motions of close pairs and visual orbital pairs can be used to study galactic formation and evolution. Author (ESA)

N82-30180# Milan Univ. (Italy). Dept. of Physics.
ABSOLUTE RADII OF SINGLE AND MULTIPLE STARS FROM THE CATALOG OF APPARENT AND ABSOLUTE RADII OF STARS (CADARS) c89
M. Fracassini and L. E. Pasinetti *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 165-167 refs Prepared in cooperation with Osservatorio Astronomico, Brera, Milan) (For primary document see N82-30146 20-88) (Contract CNR-N-81.00944.02)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

A modification of the Chalonge and Divan method for computing the apparent diameters of stars is reported on. Correlation between the modified method and intensity interferometry is good, except for the double visual, spectroscopic binary system alpha CMi. Systematic differences between the absolute radii of single and double (spectroscopic and visual) stars were ascertained. In order to improve data, observation of single and double stars, drawn from CADARS, is proposed for the Hipparcos mission. Author (ESA)

N82-30181# Graz Univ. (Austria). Inst. fuer Astronomie.
SEARCH FOR BINARY ASTEROIDS WITH THE ESA SPACE ASTROMETRY SATELLITE HIPPARCOS c89
H. J. Schober *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 169-171 refs Sponsored by Austrian Fonds zur Foerderung der Wissenschaftlichen Forschung (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Evidence as to the binary nature of certain asteroids is adduced and the use of Hipparcos to acquire data on asteroids and their satellites is proposed. Analysis of occultations, e.g., of the bright star SAO 120774 by asteroid 532 Herculina, indicates the presence of asteroid satellites, but occultation measurement accuracy is low. The striking similarity of light curves, e.g., of 44 Nysa with contact binary light curves of W YUrsae Majoris, suggests a binary nature of asteroids. Hipparcos can observe asteroids of 100 Km dia, at a distance of 2 to 3 AU. This corresponds to 0.05 arcsec apparent diameter, with the second binary component at a distance from 0.1 to 1.0 arcsec. If geometrical configurations are known in advance, masses and densities can be derived from rotation rates and absolute distances within binary systems observed by Hipparcos. Author (ESA)

N82-30182# Observatoire de Meudon (France).
HIPPARCOS COULD MAKE THE DISTANCE OF THE HYADES INTO A CONVENTIONAL CONSTANT c90
G. Cayrel deStrobel *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 173-176 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Photometric and spectroscopic abundance results for solar type G dwarfs in the Hyades are compared. Positions of 10 Hyades dwarfs in an HR diagram are compared with theoretical grids of zero age main sequence stars (ZAMS) computed with varying helium and metal abundances. The use of Hipparcos satellite

trigonometric parallaxes to locate the Hyades dwarfs on their ZAMS is considered. Photometric abundances are higher than spectroscopic ones, possibly because photometric color indices taken from the Sun are wrong. Theoretical ZAMS-HR location and photometric results suggest a lower He/H ratio for the Hyades compared with the corresponding field stars. However, HR positions are too inaccurate for determining helium content, so the order of magnitude accuracy increase provided by Hipparcos is required. Author (ESA)

N82-30183# University Coll., Cardiff (Wales). Dept. of Applied Mathematics and Astronomy.
RELATIVISTIC EFFECTS IN HIPPARCOS DATA c90
B. F. Schutz *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 181-185 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Relativistic effects on Hipparcos program data reduction and on the selection of stars for the observing list, are discussed. The general relativity model, the parameterized post-Newtonian framework, and direct measurement of the metric, are considered. Direct measurement is advocated, since the vast amount of light deflection data from Hipparcos provides an accurate basis for testing relativity. Also, direct measurement makes no assumptions about how the Sun generates the metric, unlike post-Newtonian formalisms. Selection of distant program stars as a way of detecting black holes is advocated. Deflection by a black hole would leave a characteristic signature in the residuals of the fit of a star to its best position. For example, a black hole passing below the line of sight would cause the star to execute a small loop. Author (ESA)

N82-30184# Royal Observatory, Edinburgh (Scotland).
CONCERNING RELATIVISTIC ASTROMETRY c90
S. V. M. Clube *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 187-189 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The use of Hipparcos satellite gravitational light deflection and stellar aberration data to test fundamental concepts of relativity theory is discussed. A Euclidean space-absolute time physical theory of gravity is considered. Deviations from positions predicted by general relativity are ambiguous in the case of gravitational light deflection, since modification of the field equation may be involved. No such ambiguity arises with aberration, if it is a function of the absolute motion of the Earth. The cosmic microwave background is suggested as a standard of rest for measurements of effects related to the apparent one-way velocity of light. Author (ESA)

N82-30185# Lund Observatory (Sweden).
INERTIAL FRAME DETERMINATION USING MINOR PLANETS: A PROPOSAL FOR HIPPARCOS OBSERVATIONS c90
S. Soederhjelm and L. Lindegren *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 191-192 refs Sponsored by Swedish Board for Space Activities (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The simulation of inertial reference system determination through observation of minor planets is discussed. The suitability of this determination method for the Hipparcos program is considered. Fifty planets brighter than magnitude = 13 were observed, assuming undisturbed two-body orbits during satellite scanning. System rotation and Earth orbital elements were studied. Best determined elements are those defining the plane of the ecliptic and the system rotation around the axes in the ecliptic. Element uncertainties are insensitive to choice of planet, but mean errors decrease with increasing mission length and number of planets observed. For Hipparcos, at least 25 planets are suggested. For final reductions an improvement in positional accuracy to 0.5 arcsec is needed to avoid slit ambiguities. Author (ESA)

N82-30186# Observatoire de Meudon (France).
INTERSTELLAR REDDENING AND DISTRIBUTION OF B STARS IN THE SOLAR NEIGHBORHOOD: IMPACT OF THE HIPPARCOS/TYCHO MISSION c89
J. Guibert and D. Egret (Centre de Donnees Stellaires, Strasbourg, France) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 195-198 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The uses of interstellar reddening data for studying the location and geometry of interstellar clouds, properties of dust grains, interstellar chemistry, spatial distribution of dust and stars, galactic structure, and star formation, are reviewed. Contributions to these studies by the Hipparcos satellite, and Tycho experiment (transmitting the Hipparcos star mapper photon records to the ground) are summarized. Within 100 to 200 parsecs froms the Sun, Hipparcos trigonometric parallaxes enable stars and reddening material to be located to within a few percent accuracy. Hipparcos provides accurate absolute magnitude calibrations within a few 100 parsecs. Tycho, plus MK classifications, maps the distributions of dust and hot stars up to 2 k parsecs (> 40,000 B A0 stars). Author (ESA)

N82-30187# Observatoire de Strasbourg (France).
CALIBRATION OF THE DISTANCE SCALE OF PLANETARY NEBULAE c90
A. Acker *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 199-200 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The use of Hipparcos satellite trigonometric parallaxes to calibrate distance scales for planetary nebulae and faint and distant stars is discussed. Ground based trigonometric and spectroscopic parallaxes and statistical estimates of distance are imprecise and show little agreement. Stars observed by Hipparcos for calibration should have envelopes between 2 and 3 arcsec size, with greatest magnitude = 12, when the background sky brightness = 190 stars of magnitude 10 per sq deg. Distance must be < 500 parsec. Fifteen objects meet these specifications. Author (ESA)

N82-30188# Istituto di Ricerca e Tecnologia per lo Studio del Plasma Nello Spazio, Frascati (Italy).
THE INTENDED SCIENTIFIC USES OF THE HIPPARCOS SATELLITE BY THE INSTITUTE FOR SPACE ASTROPHYSICS, FRASCATI, ITALY c12
V. Castellani *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 201-202 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Stellar evolution, planetology, and X-ray studies using Hipparcos data are discussed. For investigations of He content from the big bang, absolute magnitudes of population 2 subdrawfs within 40 parsecs can be derived from Hipparcos trigonometric parallaxes with errors within a few hundredths of a magnitude. Direct observation of RR Lyrae stars allow their absolute magnitudes to be derived and can help explain the He content of metal rich RR Lyrae. Evolution studies of stars in the thermal pulse stage can use the trigonometric magnitudes of carbon stars in our galaxy (up to 500 parsecs). Quadrupole effects on the gravitational fields of binaries containing a black hole can be detected. Author (ESA)

N82-30189# Bordeaux Univ. (France). Observatoire.
ASTROMETRIC MEASUREMENTS REQUIRED BEFORE HIPPARCOS LAUNCH c43
Y. Requieme *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 207-209 (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Ground based measurements which must be made in order to conform to Hipparcos input catalog specifications (rms error in 1988.0 star position coordinates < 1.0 arcsec for B > 10, and 1.5 arcsec for fainter stars) are estimated. About 4000 northern and 9000 southern faint stars, and 25,000 southern bright stars must be remeasured in the 24 months available from 1983.5. Work on multiple stars, clusters, minor planets, and objects for the extragalactic reference link is required. Author (ESA)

N82-30190# Geneva Observatory (Switzerland).
THE NEW GROUND-BASED PHOTOMETRIC MEASUREMENTS c35

M. Grenon *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 211-215 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Photometric data required for the Hipparcos input catalog are reviewed and an observation strategy for these measurements is proposed. Multicolor photometric investigations of interstellar reddening, stellar distances age and temperature, red giant masses and luminosities, metal abundance, and binary stars are discussed. About 60% of the program stars have not been measured photoelectrically. No further ground based photometric observations are needed if stars are selected according to V magnitude. Multicolor photometry is needed in order to fully exploit data collected by Hipparcos in order to study stellar formation rates and the chemical evolution of our galaxy. Since accuracy is limited by scintillation more than by photon noise, consecutive mode photometers are comparable with multichannel devices as regards observing time. Author (ESA)

N82-30191# Geneva Observatory (Switzerland).
RADIAL VELOCITY MEASUREMENTS COMPLEMENTARY TO HIPPARCOS **c90**
M. Mayor *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 217/220 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

The importance of radial velocity measurements in galactic evolution, kinematics, and dynamics investigations is pointed out, and photoelectric scanning measurement techniques are described. Cassegrain spectrometers covering a 1600 A spectral region, with 2 A/mm dispersion can measure the radial velocities for cold stars. Simultaneously with radial velocity determination, the scanners measure line broadening and give mean line blocking. Radial velocities can be deduced for dwarf and giant stars. For F and G dwarfs, mean heavy element concentration can be estimated accurately. Author (ESA)

N82-30192# Observatoire de Haute Provence, Forcalquier (France).
PROPOSAL TO MEASURE STELLAR RADIAL VELOCITIES FOR THE HIPPARCOS ASTROMETRY PROGRAM [PROPOSITION DE MESURE DE VITESSE RADIALES STELLAIRES POUR LE PROGRAMME HIPPARCOS] **c90**
Ch. Fehrenbach and M. Duflot (Observatoire de Marseille, France) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 221-222 refs In FRENCH (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

Measurement of radial velocities of stars less advanced than spectral type 5 is proposed. Accuracy on the order of 4 km/sec is possible, using objective prisms. Analysis of the plates gives stellar coordinates and spectral type, according to the MK system, but without luminosity. Stars which are too isolated can be measured with a slit spectrograph. Measurement is automated, enabling all stars of magnitude > 10 in the Hipparcos program to be measured within 6 years. Author (ESA)

N82-30193# Observatoire de Paris (France).
THE HIPPARCOS ASTROMETRY PROGRAM CATALOG AND GROUND-BASED ASTRONOMY [CATALOGUE HIPPARCOS ET OBSERVATIONS AU SOL] **c82**
F. Chollet and S. Debarbat *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 223-225 refs In FRENCH (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

A method for eliminating errors due to residual system rotation in inertial reference systems based on the Hipparcos program catalog is presented. The model uses existing optical data, derived from studies of the rotation of the Earth, plus Hipparcos relative positions, proper motions and parallaxes, to obtain absolute declinations, and right ascensions accurate to within a given constant. The constant is obtained from analyses of reduced planetary and solar data. Further reductions provide local latitude and time data, free of intrinsic catalog errors and of precession and nutation errors. If precession and nutation errors in original data are significant, precise optical and radio measurement of galactic and extragalactic objects can separate residual rotation from precession-nutation. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N82-30194*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF PHOTOMETRIC DATA FOR NEARBY STARS
Wayne H. Warren, Jr. Apr. 1982 17 p refs
(NASA-TM-84768; NSSDC/WDC-A-R/S-82-13; NAS 1.15:84768) Avail: NTIS HC A02/MF A01 CSCL 03A

A computer list of all photometric systems (of those considered), in which each star was measured is provided. The file is a subset of a much larger and more comprehensive compilation, which lists all measured photoelectric photometric systems for any star that has been measured in at least one photoelectric system. In addition to the photometric system identifications, cross identifications to the Henry Draper and Durchmusterung catalogs and apparent visual magnitudes are included. Author

N82-30195*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF FAINT BLUE OBJECTS AT HIGH GALACTIC LATITUDE
Wayne H. Warren, Jr. May 1982 12 p refs
(NASA-TM-84769; NSDC/WDC-A-R/S-82-14; NAS 1.15:84769) Avail: NTIS HC A02/MF A01 CSCL 03A

The machine-readable data file of a catalog of objects selected according to relative ultraviolet excess from ubv 3-color 1.2 m Palomar Schmidt plates is described. Author

N82-30196*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE CATALOG OF GALACTIC O TYPE STARS
Wayne H. Warren, Jr. May 1982 17 p refs
(NASA-TM-84770; NAS 1.15:84770) Avail: NTIS HC A02/MF A01 CSCL 03A

The Catalog of Galactic O-Type Stars (Garmany, Conti and Chiosi 1982), a compilation from the literature of all O-type stars for which spectral types, luminosity classes and UBV photometry exist, contains 765 stars, for each of which designation (HD, DM, etc.), spectral type, V, B-V, cluster membership, Galactic coordinates, and source references are given. Derived values of absolute visual and bolometric magnitudes, and distances are included. The source reference should be consulted for additional details concerning the derived quantities. This description of the machine-readable version of the catalog seeks to enable users to read and process the data with a minimum of guesswork. A copy of this document should be distributed with any machine readable version of the catalog. A.R.H.

N82-30197*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE CATALOGUE OF INDIVIDUAL UBV AND UVBY BETA OBSERVATIONS IN THE REGION OF THE ORION OB1 ASSOCIATION
Wayne H. Warren, Jr. May 1982 15 p refs
(NASA-TM-84771; NSSDC/WDC-A-R/S-82-16) Avail: NTIS HC A02/MF A01 CSCL 03A

The machine-readable files of individual UBV observations of 106 stars in the vicinity of the Orion Nebula (the Sword region) and individual uvby beta observations of 508 stars in all regions of the Orion OB 1 association are described. For the UBV data the stars are identified by their Brun numbers, with cross identifications to the chart numbers used in Warren and Hesser; the uv by beta stars are identified by the aforementioned

chart numbers and HD, BD or P (= pi); numbers in that order of preference. Author

N82-30198*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE THIRD SANTIAGO-PULKOVO FUNDAMENTAL STARS CATALOGUE (SPF-3)
Wayne H. Warren, Jr. May 1982 10 p refs
(NASA-TM-84772; NSSDC/WDC-A-R/S-82-17; NAS 1.15:84772) Avail: NTIS HC A02/MF A01 CSCL 03A

The machine-readable version of a catalog of right ascensions of 671 bright stars is described. The observations were made in a series consisting of 70 stars observed along the meridian from +42 deg to the pole in upper culmination and from the pole to -70 deg in lower culmination. Author

N82-30199*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE BRIGHT STAR CATALOGUE
Wayne H. Warren, Jr. May 1982 24 p refs
(NASA-TM-84773; NAS 1.15:84773) Avail: NTIS HC A02/MF A01 CSCL 03A

The machine-readable version of The Bright Star Catalogue, 4th edition, is described. In addition to the large number of newly determined fundamental data, such as photoelectric magnitudes, MK spectral types, parallaxes, and radial velocities, the new version contains data and information not included in the third edition such as the identification of IR sources, U-B and R-I colors, radial velocity comments (indication and identification of spectroscopic and occultation binaries), and projected rotational velocities. The equatorial coordinates for equinoxes 1900 and 2000 are recorded to greater precision details concerning variability, spectral characteristics, duplicity, and group membership are included. Data compiled through 1979, some information and variable-star designations found through 1981 are considered. A.R.H.

N82-30200*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE LOWELL PROPER MOTION SURVEY NORTHERN HEMISPHERE, THE G NUMBERED STARS
Wayne H. Warren, Jr. May 1982 18 p refs
(NASA-TM-84774; NSSDC/WDC-A-R/S-82-19; NAS 1.15:84774) Avail: NTIS HC A02/MF A01 CSCL 03A

Observed positions, proper motions, estimated photographic magnitudes and colors, and references to identifications in other catalogs are included. Photoelectric data on the UBV system are included for many stars, but no attempt was made to find all existing photometry. The machine-readable catalog is described. Author

N82-30201*# Ohio State Univ., Columbus. Dept. of Physics.
NITROGEN, OXYGEN AND AIR BROADENED WIDTHS AND RELATIVE INTENSITIES OF N2O LINES NEAR 2450/cm
R. L. Hawkins [1982] 17 p refs
(Grant NsG-7469)
(NASA-CR-169155; NAS 1.26:169155) Avail: NTIS HC A02/MF A01 CSCL 03A

Spectra of the v sub 1 + 2v sub 2 and the weak underlying v sub 1 + 3v sub 2 - v sub 2 band of N2O near 2450/cm were analyzed by the nonlinear, least squares, whole band technique. The oxygen, nitrogen, and air broadened line widths and the relative line intensities were determined. The air broadened widths, for/m/ >3, are in agreement with those in the 1980 AFGL line listing and the relative band intensities also agree, within about 20% with the values in this listing. Author

N82-30202# Lowell Observatory, Flagstaff, Ariz.
SATURN'S E RING
W. A. Baum, T. J. Kreidl, and L. H. Wasserman [1982] 6 p refs
Avail: NTIS HC A02/MF A01

The spatial distribution of material in Saturn's E ring is derived from ground based CCD observations obtained at the time of the 1980 edge on presentation. The ring commences abruptly near 3 R sub S, peaks at the orbit of Enceladus (3.94 R sub S), and has tenuous outskirts to more than 8 R sub S. On reasonable assumptions, we calculate the attenuation factor to be 5 x 10 to the -11th power 0.1 km in the equatorial plane near Enceladus, and the physical thickness of the ring there to be 7500 km (FWHM). The attenuation factor in the equatorial plane is lower by a factor of 8 at Tethys, 76 at Dione, and roughly 1000 at Rhea, while the physical thickness increases by factors of 1.7, 2.9, and 5.5, respectively. This distribution of ring material appears to call for interactions with charged particles and fields. If the E ring particles are predominantly icy and small, the total mass of the ring is probably less than 1 million tons. Author

N82-30148# Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
THE SATELLITE HIPPARCOS
J. Kovalevsky *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 15-20 ref (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30149# Copenhagen Observatory (Denmark).
TYCHO: A PLANNED ASTROMETRIC AND PHOTOMETRIC SURVEY FROM SPACE
E. Hoeg, C. Jaschek (Centre de Donnees Stellaires, Strasbourg, France), and L. Lindegren (Lund Obs., Sweden) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 21-25 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30150# Copenhagen Observatory (Denmark).
PROPOSED ULTRAVIOLET OBSERVATIONS WITH TYCHO
E. Hoeg *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 27-28 ref (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30156# Cambridge Univ. (England). Inst. of Astronomy.
REPORT BY INTERNATIONAL ASTRONOMICAL UNION COMMISSION 24 WORKING GROUP ON RADIO/OPTICAL ASTROMETRIC SOURCES FOR THE ESTABLISHMENT OF AN INERTIAL REFERENCE FRAME
A. N. Argue *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 57-59 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30166# Institut d'Astrophysique, Paris (France).
ABSOLUTE MAGNITUDES AND OTHER BASIC PARAMETERS OF O AND B STARS
L. Divan and J. Zorec *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 101-104 refs Prepared in cooperation with College de France, Paris (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30168# Observatoire de Meudon (France).
STUDY OF ABSOLUTE MAGNITUDES OF B AND Be STARS
D. Briot and A. M. Hubert-Delplace *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 107-110 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30169# Observatoire de Meudon (France).
ASTROPHYSICAL PARAMETERS FOR Ap AND Am STARS WITH HIPPARCOS
M. Gerbaldi (Inst. d'Astrophysique, Paris), D. Briot, C. Burkhardt (Obs. de Lyon), D. Egret (Obs. de Strasbourg), M. Floquet, A. Gomez, S. Grenier, B. Hauck (Lausanne Univ., Switzerland), C. Jaschek (Obs. de Strasbourg), *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 111-113 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30171# Observatoire de Lyon (France).
OBSERVATION OF SELECTED NEARBY COOL CARBON STARS (CCS)
J. Bergeat *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 121-122 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30172# Osservatorio Astronomico, Brera, Milan (Italy).
THE LUMINOSITY AND RELATED PARAMETERS OF VARIABLE AND NON-VARIABLE A, F STARS
E. Antonello, M. Fracassini, L. E. Pasinetti, and L. Pastori *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 123-124 refs Prepared in cooperation with Milan Univ. (For primary document see N82-30146 20-88)
(Contract CNR-N.81.00944.02)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30174# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
PHOTOMETRIC ASPECTS OF TYCHO
C. Jaschek *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 133-135 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30175# Montpellier Univ. (France).
MIRA TYPE VARIABLE STARS AND THE IMPACT OF THE HIPPARCOS MISSION
M. O. Mennessier, J. Guibert (Obs. de Meudon, France), and Nguyen-Q-Rieu (Obs. de Meudon, France) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 137-138 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30177# Lund Observatory (Sweden).
IMAGING PROPERTIES OF HIPPARCOS AND THE OBSERVATION OF MULTIPLE STARS
L. Lindegren *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 147-152 refs Sponsored by Swedish Board for Space Activities (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30178# Lille Univ. (France).
CHARACTERISTICS OF DOUBLE STARS OBSERVABLE BY HIPPARCOS [CARACTERISTIQUES DES ETOILES DOUBLES OBSERVABLES PAR HIPPARCOS]
P. Baachus *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 153-159 refs In FRENCH (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30179# Belgian Royal Observatory, Uccle.
THE INTEREST OF DOUBLE STAR OBSERVATIONS BY HIPPARCOS
J. Dommanget *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 161-164 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30180# Milan Univ. (Italy). Dept. of Physics.
ABSOLUTE RADII OF SINGLE AND MULTIPLE STARS FROM THE CATALOG OF APPARENT AND ABSOLUTE RADII OF STARS (CADARS)
M. Fracassini and L. E. Pasinetti *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 165-167 refs Prepared in cooperation with Osservatorio Astronomico, Brera, Milan) (For primary document see N82-30146 20-88)
(Contract CNR-N-81.00944.02)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30181# Graz Univ. (Austria). Inst. fuer Astronomie.
SEARCH FOR BINARY ASTEROIDS WITH THE ESA SPACE ASTROMETRY SATELLITE HIPPARCOS
H. J. Schober *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 169-171 refs Sponsored by Austrian Fonds zur Foerderung der Wissenschaftlichen Forschung (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30186# Observatoire de Meudon (France).
INTERSTELLAR REDDENING AND DISTRIBUTION OF B STARS IN THE SOLAR NEIGHBORHOOD: IMPACT OF THE HIPPARCOS/TYCHO MISSION
J. Guibert and D. Egret (Centre de Donnees Stellaires, Strasbourg, France) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 195-198 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30238*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIO ASTRONOMY
R. D. Shaffer and S. Gulkis *In its* The Telecommun. and Data Acquisition Rept. 15 Jul. 1982 p 1-2 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 03A

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N82-30203*# Colorado Univ., Boulder. Lab for Atmospheric and Space Physics.
A SEARCH FOR DIFFUSE BAND PROFILE VARIATIONS IN THE RHO OPHIUCHI CLOUD
Theodore P. Snow, J. Gethyn Timothy, and Stephen Sear [1982] 22 p refs
(Grant NsG-7626)
(NASA-CR-169111; NAS 1.26:169111) Avail: NTIS HC A02/MF A01 CSCL 03B

High signal-to-noise profiles of the broad diffuse interstellar ' and at 4430 A were obtained on the 2.2-m telescope at the Mauna Kea Observatory, using the newly-developed pulse-counting multi-anode microchannel array detector system in an effort to determine whether the band profile varies with mean grain size as expected if the band is produced by absorbers embedded in grain lattices. The lack of profile variability over several lines of sight where independent evidence indicates that the mean grain size varies shows that lambda 4430 is probably not formed by the same grains that are responsible for interstellar extinction at visible wavelengths. The possibility that this band is created by a population of very small (< approximately 100 A) grains is still viable, as is the hypothesis that it has a molecular origin. Author

N82-30204*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ABSENCE OF RAPID X-RAY VARIABILITY IN ACTIVE GALAXIES Ph.D. Thesis - Maryland Univ.
A. F. Tennant and R. F. Mushotzky Jun. 1982 41 p refs Submitted for publication
(NASA-TM-83966; NAS 1.15:83966) Avail: NTIS HC A03/MF A01 CSCL 03B

Variations on time scales ranging from minutes to several hours in the X-ray flux from 54 observations of 38 active galaxies are identified. The sample is composed mostly of Seyfert 1 galaxies but also includes radio galaxies, NELG's BL Lacs and 3C 273. Only NGC 6814 varied on time scales as short as 100 sec. No other source was observed to vary with a time scale of less than 12 hours. Large amplitude short term variations are not a characteristic of the X-ray emission from active galaxies. Upper limits on sigma sub I/I ranged from 2% for Cen A, 5% for NGC 4151, to approximately 20% for sources giving 1 ct/sec in the detector. Three objects NGC 3227, NGC 4151 and MCG 5-23-16 show variability consistent with a time scale of approximately 1 day. Ways to reconcile the rapid variability seen for NGC 6814 (and NGC 4051) with the general stability observed for the other objects are considered. S.L.

N82-30151# European Space Agency, Paris (France).
THE HIPPARCOS PROGRAM [LE PROGRAMME HIPPARCOS]
P. Lacroute *In its* The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 29-30 In FRENCH; ENGLISH summary (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30153# Astronomische Rechen-Institut, Heidelberg (West Germany).
DETERMINATION OF POSITIONS AND THE REFERENCE SYSTEM
W. Fricke *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 43-47 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30157*# Texas Univ., Austin. Dept. of Astronomy.
FIDUCIAL REFERENCE FOR THE HIPPARCOS REFERENCE SYSTEM
D. Hemenway, W. H. Jeffreys, P. J. Shells, and R. L. Duncombe *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 61-63 ref (For primary document see N82-30146 20-88)
(Grant NAGw-233)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80 CSCL 03B

N82-30158# Astronomische Rechen-Institut, Heidelberg (West Germany).
RADIO STARS AS CONNECTING LINK OF THE HIPPARCOS AND VERY LONG BASELINE INTERFEROMETRY (VLBI) REFERENCE FRAMES
H. G. Walter *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 65-68 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30160# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
HIPPARCOS PROPER MOTIONS
R. Wielen *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 77-82 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30161# Stockholm Observatory (Sweden).
GALACTIC STRUCTURE RESULTS DERIVED FROM STUDIES OF LOCAL KINEMATICS
K. Loden *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 83-84 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30162# Royal Observatory, Edinburgh (Scotland).
THE ROLE OF EARLY TYPE STARS IN STUDIES OF GALACTIC DYNAMICS
S. V. M. Clube *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 85-87 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30163# Observatoire de Meudon (France).
A COMPARISON OF B AND Be STAR KINEMATICS
D. Briot *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 89-90 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30164# Ruhr Univ., Bochum (West Germany). Astronomisches Inst.
ADVANTAGES, IMPLEMENTATION AND COST ESTIMATE OF A LONG-LIFE VERSION OF THE HIPPARCOS PAYLOAD
T. Schmidt-Kaler *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 91-92 (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30165# Kapteyn Astronomical Lab., Groningen (Netherlands).
TRIGONOMETRIC PARALLAXES: THE STELLAR CONTENT OF THE VOLUME OF SPACE COVERED BY HIPPARCOS AND SOME OF ITS ASTROPHYSICAL IMPLICATIONS
A. Blaauw *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 97-100 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30167# Amsterdam Univ. (Netherlands). Inst. of Astronomy.
PARALLAXES FOR PRE-MAIN SEQUENCE HERBIG Ae/Be STARS
P. S. The and H. R. E. TjinADjie *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 105-106 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30170# Royal Greenwich Observatory, Herstmonceux (England).
TRIGONOMETRIC PARALLAXES FROM THE GROUND AND FROM HIPPARCOS
C. A. Murray *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 115-119 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30173# Observatoire de Paris (France).
HIPPARCOS AND THE DETERMINATION OF THE HELIUM CONTENT OF SOME LOW-MASS NONEVOLVED HALO AND DISK STARS OF THE SOLAR NEIGHBORHOOD, INFERRED FROM THE FINE STRUCTURE OF THE H-R DIAGRAM
M.-N. Perrin *In* ESA The Sci. Aspects of The Hipparcos Space Astrometry Mission May 1982 p 125-128 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30182# Observatoire de Meudon (France).
HIPPARCOS COULD MAKE THE DISTANCE OF THE HYADES INTO A CONVENTIONAL CONSTANT
G. Cayrel deStrobel *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 173-176 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30183# University Coll., Cardiff (Wales). Dept. of Applied Mathematics and Astronomy.
RELATIVISTIC EFFECTS IN HIPPARCOS DATA
B. F. Schutz *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 181-185 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30184# Royal Observatory, Edinburgh (Scotland).
CONCERNING RELATIVISTIC ASTROMETRY
S. V. M. Clube *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 187-189 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30185# Lund Observatory (Sweden).
INERTIAL FRAME DETERMINATION USING MINOR PLANETS: A PROPOSAL FOR HIPPARCOS OBSERVATIONS
S. Soederhjelm and L. Lindegren *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 191-192 refs Sponsored by Swedish Board for Space Activities (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30187# Observatoire de Strasbourg (France).
CALIBRATION OF THE DISTANCE SCALE OF PLANETARY NEBULAE
A. Acker *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 199-200 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30191# Geneva Observatory (Switzerland).
RADIAL VELOCITY MEASUREMENTS COMPLEMENTARY TO HIPPARCOS
M. Mayor *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 217/220 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30192# Observatoire de Haute Provence, Forcalquier (France).
PROPOSAL TO MEASURE STELLAR RADIAL VELOCITIES FOR THE HIPPARCOS ASTROMETRY PROGRAM [PROPOSITION DE MESURE DE VITESSE RADIALES STELLAIRES POUR LE PROGRAMME HIPPARCOS]
Ch. Fehrenbach and M. Duflot (Observatoire de Marseille, France) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 221-222 refs In FRENCH (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

N82-30267# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
ONERA SATELLITE GRAVITY GRADIOMETRY PROJECT
A. Bernard *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 51-57 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N82-30205*# CosmoScience Associates, Inc., Stony Brook, N.Y.
SPACE ENVIRONMENT AND LUNAR SURFACE PROCESSES, 2 Final Report
George M. Comstock 31 Jan. 1982 53 p refs
(Contract NASw-3273)
(NASA-CR-169190; NAS 1.26:169190) Avail: NTIS HC A04/MF A01 CSCL 03B

The top few millimeters of a surface exposed to space represents a physically and chemically active zone with properties different from those of a surface in the environment of a planetary atmosphere. To meet the need or a quantitative synthesis of the various processes contributing to the evolution of surfaces of the Moon, Mercury, the asteroids, and similar bodies, (exposure to solar wind, solar flare particles, galactic cosmic rays, heating from solar radiation, and meteoroid bombardment), the MESS 2 computer program was developed. This program differs from earlier work in that the surface processes are broken down as a function of size scale and treated in three dimensions with good resolution on each scale. The results obtained apply to the development of soil near the surface and is based on lunar conditions. Parameters can be adjusted to describe asteroid regoliths and other space-related bodies. A.R.H.

N82-30206*# Martin Marietta Aerospace, Denver, Colo.
ANALYSIS AND INTERPRETATION OF VIKING INORGANIC CHEMISTRY DATA (MARS DATA ANALYSIS PROGRAM) Final Report
Benton C. Clark Feb. 1982 37 p refs
(Contract NASw-3284)
(NASA-CR-169192; MCR-81-653; NAS 1.26:169192) Avail: NTIS HC A03/MF A01 CSCL 03B

Soil samples gathered by the Viking Lander from the surface of Mars were analyzed. The Martian fines were lower in aluminum, iron, sulfur, and chlorine than typical terrestrial continental soils or lunar mare fines. Sample variabilities were as great within a few meters as between lander locations (4500 km apart) implying the existence of a universal Martian regolith component of constant average composition. R.J.F.

N82-30207*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE NATURE OF LARGE-SCALE TURBULENCE IN THE JOVIAN ATMOSPHERE
Jim L. Mitchell 15 Jan. 1982 298 p refs
(Contract NAS7-100)
(NASA-CR-169138; JPL-Publ-82-34; NAS 1.26:169138) Avail: NTIS HC A13/MF A01 CSCL 03B

The energetics and spectral characteristis of quasi-geostrophic turbulence in Jupiter's atmosphere are examined using sequences of Voyager images and infrared temperature soundings. Using global wind measurements momentum transports associated with zonally symmetric stresses and turbulent stresses are quantified. Though a strong up-gradient flux of momentum by eddies was observed, measurements do not preclude the possibility that symmetric stresses play a critical role in maintaining the mean zonal circulation. Strong correlation between the observed meridional distribution of eddy-scale kinetic energy and available potential energy suggests coupling between the observed cloudtop tu[illegible] motions and the upper tropospheric thermodynamics. An [illegible]rt energy budget for Jupiter's upper troposphere is formulated. Author

N82-30208*# Carmel Research Center, Santa Monica, Calif.
PIONEER 10/11 DATA ANALYSIS OF THE PLASMA ANALYZER EXPERIMENT Final Report
Devrie S. Intriligator Mar. 1982 64 p refs
(Contract NAS2-10925)
(NASA-CR-166378; NAS 1.26:166378) Avail: NTIS HC A04/MF A01 CSCL 03B

The Pioneer 10 plasma analyzer detected the 10 plasma torus. Evidence was found of corotating ions which appear to be primarily S (++) and O (++) in the Pioneer 10 plasma data as the spacecraft moved inward from 6.9 to 5.4 R sub J. The Pioneer plasma analyzer was effective in obtaining information on the heavy ion populations in the Jovian magnetosphere. Interplanetary solar wind plasma shocks can trap energetic particles (cosmic rays) for weeks and out to distances of 17 AU. Energetic particles (o.5 MeV to 20 MeV) were confined between two plasma shocks from solar flares as the shocks propagated outward in the solar system. Author

N82-30209*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth and Planetary Sciences.
STUDIES OF PLANETARY UPPER ATMOSPHERES THROUGH OCCULTATIONS Final Technical Report, 1 Jul. 1980- 30 Jun. 1982
James L. Elliot 30 Jun. 1982 292 p refs
(Grant NAGw-68)
(NASA-CR-169189; NAS 1.26:169189) Avail: NTIS HC A13/MF A01 CSCL 03B

The structure, composition, dynamics and energy balance of planetary upper atmospheres through interpretation of steller occultation data from Uranus is discussed. The wave-optical problem of modelling strong scintillation for arbitrary turbulent atmospheres is studied, as well as influence of turbulence. It was concluded that quasi-global features of atmospheric structure are accurately determined by numerical inversion. Horizontally inhomogeneous structures are filtered out and have little effect on temperature profiles. R.J.F.

N82-30210*# Arizona Univ., Tucson.
COMETS
Laurel L. Wilkening, ed. and Mildred Shapley Matthews, ed. [1982] 12 p refs Sponsored by NASA
(NASA-CR-169237; NAS 1.26:169237) Avail: NTIS HC A02/MF A01 CSCL 03B

Vacuum ultraviolet observations from sounding rockets and satellite observatories of the gaseous comae of several comets are reviewed. The earliest of these led to discovery of the hydrogen envelope extending for millions of km from the nucleus. Subsequent observations of H I Lyman alpha, the OH (0,0 band and the oxygen resonance triplet provided strong evidence for the water-ice model of the cometary nucleus. Several species

were discovered in the coma including C, C(+), CO, S, and CS. High resolution spectroscopy and the spatial variation of the observed emissions provide means to elucidate the production and excitation mechanisms of these species. The similarity of the spectra of the half dozen comets observed to date argues for a common, homogeneous composition (with the exception of dust and CO) of the cometary ice and a minimal effect on the neutral species due to molecular collisions in the inner coma. S.L.

N82-30271# Joint Publications Research Service, Arlington, Va.
VENERA DATA ON ATMOSPHERE AND SURFACE COMPOSITION
Yu. Surkov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 7-11 Transl. into ENGLISH from Pravada (USSR), 3 Mar. 1982 p 3 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

N82-30272# Joint Publications Research Service, Arlington, Va.
VENERA FINDINGS ON VOLCANIC AND ELECTRICAL PHENOMENA
L. Ksanfomaliti *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 12-15 Transl. into ENGLISH from Pravda (USSR), 8 Mar. 1982 p 7 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N82-30211# Herzberg Inst. of Astrophysics, Ottawa (Ontario).
OBSERVATIONS OF SOLAR FLUX AT THE ALGONQUIN RADIO OBSERVATORY ON 2800 MHz AND THE DOMINION RADIO ASTROPHYSICAL OBSERVATORY ON 2700 MH Monthly Report, Jan. - Dec. 1980
M. B. Bell, H. P. Gagnon, and J. D. Moore Jun. 1981 156 p refs
(ARO-10; NRC-19443) Avail: NTIS HC A08/MF A01

Daily tabulations of the radio flux at 2800 MHz from the Algonquin Radio Observatory and at 2700 MHz from the Dominion Radio Astrophysical Observatory are presented for the year 1980. This period marks the fifth year into sunspot cycle 21. R.J.F.

N82-30212*# New Hampshire Univ., Durham. Space Science Center.
ON THE PREFERENTIAL ACCELERATION AND HEATING OF SOLAR WIND HEAVY IONS
Philip A. Isenberg and Joseph V. Hollweg Jun. 1982 53 p refs
(Grants NAGw-76; NAG5-130)
(NASA-CR-169105; NAS 1.26:169105) Avail: NTIS HC A04/MF A01 CSCL 03B

The feasibility of producing the observed velocities and temperatures of solar wind heavy ions by the resonant cyclotron interaction with left-polarized hydromagnetic waves was investigated. A 'most favorable case' scenario in which the waves are parallel-propagating and dispersionless and the energy for the wave acceleration and heating is taken from saturated low-frequency Alfven waves via a cascade to higher frequencies, is incorporated into a numerical solar wind code and agreement with observation is tested. The resonant cyclotron interaction is shown to fail on at least three points, even in this most favorable case. A.R.H.

N82-30213*# New Hampshire Univ., Durham. Space Science Center.
COLLISIONAL DAMPING OF SURFACE WAVES IN THE SOLAR CORONA
Bruce E. Gordon and Joseph V. Hollweg Jun. 1982 36 p refs
(Grants NAGw-76; NAG5-130)
(NASA-CR-169095; NAS 1.26:169095) Avail: NTIS HC A03/MF A01 CSCL 03B

The damping of surface waves by viscosity and heat conduction is evaluated. For the solar corona, it is found that surface waves dissipate efficiently only if their periods are shorter than a few tens of seconds and only if the background magnetic field is less than about 10 Gauss. Heating of quiet coronal regions is possible if the coronal waves have short periods, but they cannot heat regions of strong magnetic field, such as coronal active region loops. Author

N82-30214*# California Univ., San Diego. Science Study Group.
SOLAR TERRESTRIAL OBSERVATORY Final Report
Oct. 1981 50 p
(Contract NAS8-33795)
(NASA-CR-162059; NAS 1.26:162059) Avail: NTIS HC A03/MF A01 CSCL 03B

Eight basic solar-terrestrial scientific objectives that benefit from the Shuttle/Platform approach and a program of measurements for each are discussed. The objectives are to understand: (1) solar variability, (2) wave-particle processes, (3) magnetosphere-ionosphere mass transport, (4) the global electric circuit, (5) upper atmospheric dynamics, (6) middle atmospheric chemistry and energetics, (7) lower atmospheric turbidity, and (8) planetary atmospheric waves. A two stage approach to a multidisciplinary payload is developed: an initial STO, that uses a single platform in a low-Earth orbit, and an advanced STO that uses two platforms in differing orbits. Author

N82-30215*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MICROWAVE AND HARD X-RAY OBSERVATIONS OF A SOLAR FLARE WITH A TIME RESOLUTION OF BETTER THAN 100 MS
Pierre Kaufmann, F. M. Strauss, J. E. R. Costa, B. R. Dennis, A. Kiplinger, K. J. Frost, and L. E. Orwig Feb. 1982 17 p refs Prepared in cooperation with Instituto de Pesquisas Espaciais Submitted for publication
(NASA-TM-84715; NAS 1.15:84715; INPE-2336-PRE/083)
Avail: NTIS HC A02/MF A01

Simultaneous microwave and X-ray observations are presented for a solar flare detected on 1980 May 8 starting at 1937 UT. The X-ray observations were made with the Hard X-Ray Burst Spectrometer on the Solar Maximum Mission and covered the energy range from 28-490 keV with a time resolution of 10 ms. The microwave observations were made with the 5 and 45 foot antennas at the Itapetinga Radio Observatory at frequencies of 7 and 22 GHz, with time resolutions of 100 ms and 1 ms respectively. Detailed correlation analysis of the different time profiles of the event show that the major impulsive in the X-ray flux preceded the corresponding microwave peaks at 22 GHz by about 240ms. For this particular burst the 22 GHz peaks preceded the 7 GHz by about 1.5s. Observed delays of the microwave peaks are too large for a simple electron beam model but they can be reconciled with the speeds of shock waves in a thermal model. Author

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N82-30155# Cambridge Univ. (England). Inst. of Astronomy.
THE SELECTION OF STARS FOR LINKING THE HIPPARCOS FRAME TO EXTRAGALACTIC RADIO SOURCES BY SPACE TELESCOPE Progress Report
A. N. Argue, R. D. Baxter, B. L. Morgan (Imperial Coll. of Science and Technology), and H. Vine (Imperial Coll. of Science and Technology) *In* ESA The Sci. Aspects of the Hipparcos Space Astrometry Mission May 1982 p 53-55 refs (For primary document see N82-30146 20-88)
Avail: NTIS HC A11/MF A01; ESA, Paris FF 80

99 GENERAL

N82-30216 Applied Physics Lab., Johns Hopkins Univ., Laurel, Md. Chemical Propulsion Information Agency.
THE 15TH JANNAF PERFORMANCE STANDARDIZATION SUBCOMMITTEE MEETING MINUTES
Henry F. Hege, ed. Mar. 1982 333 p refs Meeting held in Salt Lake City, 4-5 Mar. 1982
(Contract N00024-81-C15301)
(AD-A116740; CPIA-PUB-355) Avail: Issuing Activity CSCL 21/9

Status reports and user comments on the improved solid performance program are presented. Chamber flowfield modelling, particle impact erosion, the nozzleless performance program (NPP), burn rate determination methodology, performance measurements, thermochemical data, and propellant temperature sensitivity parameters are discussed. For individual titles, see N82-30217 through N82-30236.

N82-30217 Software and Engineering Associates, Inc., Santa Ana Heights, Calif.
IMPROVED BOUNDARY LAYER MODULE (BLM) FOR THE SOLID PERFORMANCE PROGRAM (SPP) **c34**
Douglas E. Coats and Tuncer Cebeci (CBC Enterprises, Inc.) *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 13-20 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

The requirements for a replacement to the Bartz boundary layer code, the standard method of computing the performance loss due to viscous effects by the solid performance program, were discussed by the propulsion community along with four nationally recognized boundary layer experts. A consensus was reached regarding the preferred features for the analysis of the replacement code. The major points that were agreed upon are: (1) finite difference methods are preferred over integral methods; (2) a single equation eddy viscosity model was considered to be adequate for the purpose of computing performance loss; (3) a variable grid capability in both coordinate directions would be required; (4) a proven finite difference algorithm which is not stability restricted should be used, that is, an implicit numerical scheme would be required; and (5) the replacement code should be able to compute both turbulent and laminar flows. The program should treat mass addition at the wall as well as being able to calculate a stagnation point starting line. A.R.H.

N82-30218 Software and Engineering Associates, Inc., Santa Ana Heights, Calif.
A NOZZLE CONTOUR OPTIMIZATION MODULE (NCO) FOR THE IMPROVED SOLID PERFORMANCE PROGRAM (SPP) **c20**
Gary R. Nickerson and Lanh D. Dang *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 25-50 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

To enhance the utility of the SPP as a direct design tool, an automated nozzle contour optimization module (NCO) was developed. The module conducts an automated design of the nozzle wall contour adjacent to the supersonic portion of the flow. The nozzle inlet and throat geometry are given, and remain fixed throughout the optimization process. The optimization process is carried out using a direct method as opposed to a calculus of variations method. This means that a nozzle exhaust contour of a given geometric type, such as a parabola of specified length, is required and the NCO module will search out the maximum thrust contour of that type. The cycle line search procedured used by the NCO module is described. The geometric shapes and constraints that are allowed are also discussed. Some results are presented for nozzle flows with, and without, particulates. A.R.H.

N82-30219 KVB, Inc., Irvine, Calif.
OD3P REPORT Status Report **c34**
S. C. Hunter *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 51-68 ref (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

The numerical method was modified in a manner that substantially improved the accuracy of gas-phase kinetic reaction and gas-particle velocity and thermal lags, meeting the program objectives of conservtion errors of less than 0.1 percent, while at the same time reducing the computer time required. These improvements and better method for starting conditions at the nozzle inlet, based on particle asymptotic fractional lag are discussed. A.R.H.

N82-30220 Atlantic Research Corp., Gainesville, Va.
NOZZLELESS PERFORMANCE PROGRAM **c20**
I. M. Procinsky, J. W. Murray, A. J. Mikeska, and M. E. Tonkin *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 69-79 Prepared in cooperation with Software and Engineering Associates, Inc., Santa Ana Heights, Calif. (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

Progress is reported in the development of a comprehensive computer program to predict the ballistics performance of a nozzless rocket motor to within + or - 5% for instantaneous values, and + or - 2% for integral values and burn time. Where possible, the program incorporates existing state of the art models, but in several instances, submodels for phenomena that are critical to the performance of a nozzless motor required either significant modification or the generation of another model. Critical changes included grain design and internal ballistics, combustion efficiency, erosive burning, and ignition transient models. For the grain deflection effort, a model was constructed based on a combination of the TEXGAP and HONDO codes to allow for dynamic loading effects. The basic program was structured to keep running time down to a practical level. A.R.H.

N82-30221 Atlantic Research Corp., Gainesville, Va.
NPP GRAIN DEFLECTION MODEL **c28**
J. W. Murray, A. J. Mikeska, and M. E. Tonkin *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 80-87 (For primary document see N82-302[illegible], 20-99)
Avail: Issuing Activity CSCL 21/9

Ballistic prediction techniques should include the effects of propellant contour changes, both during thermal cycling and motor operation. Due to the time and temperature dependent propellant physical properties, both the duration of motor operation and the temperature at which operation occurs can greatly affect the propellant's deflections. Pressure distributions along the length of the grain and in the region of the exit cone formed by the propellant itself are significant contributors to the grain deformations. Ignition characteristics of nozzleless motors are typically a pressure spike to the maximum pressure followed by a decaying pressure until the end of burn; hence, large deformation viscoelastic and dynamic response material behavior may be important contributors to grain deflection. The deflection model developed for incorporation into the NPP program is presented. The basic approach taken to model grain deflection is to divide the model into three distinct modules; thermal cooldown module, transient or dynamic viscoelastic finite strain module, and nontransient or TEXGAP module. A.R.H.

N82-30222 Software and Engineering Associates, Inc., Santa Ana Heights, Calif.
INTERIOR BALLISTICS CALCULATIONS FOR THE NOZZLELESS PERFORMANCE PROGRAM (NPP) **c20**
Douglas E. Coats and Lanh D. Dang *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 98-118 Sponsored by AFRPL Prepared for Atlantic Research Corp., Gainesville, Va. (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

A mathematical model is described which computes the internal flowfield in nozzleless solid rocket motors. An implicit numerical integration scheme is used to compute the one-dimensional time dependent flow equations for a gas-particle mixture with finite dynamic and thermal lags between the particulate and gas phases. These equations are integrated through the ignition transient with a small time step (Courant number = 1 to 10) on into quasi-steady operation with a large time step

(Courant number = 1,000) and finally to tail off with a moderate time step (Courant number approximately 10 to 100). Both erosive burning and propellant deformation effects on the internal ballistics are determined. The grain burn back profile is computed instantaneously by using a cubic spline fit. Problems encountered concerning the internal ballistics calculation and the methods used to solve them are discussed. A.R.H.

N82-30223 Atlantic Research Corp., Alexandria, Va.
PROPELLANT BURNING CALCULATIONS **c25**
M. K. King *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 99-114 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

A method is discussed for determining the burning rate of the propellant at each location (node) and time, given the pressure, crossflow velocity, grain port diameter, and time rate of change of pressure and crossflow velocity (all supplied from other parts of the code). The analysis is broken into two major parts: calculation of quasi-steady-state burn rate as a function of pressure, crossflow velocity and port diameter; and calculation of a correction in burning rate for unsteady-state effects. For purposes of minimizing computer run time, provision is made for eliminating calculations of unsteady-state corrections for values of dP/d theta lower than a critical value, to be input by the user. Several optional procedures for calculation of the quasi-steady-state burning rate are included to permit maximum utilization of data where available. A.R.H.

N82-30224 Atlantic Research Corp., Alexandria, Va.
METAL COMBUSTION EFFICIENCY **c25**
M. K. King *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 115-134 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

Neither the existing ARC or CSD metal combustion efficiency codes, developed for nozzled motors, are adequate for NPP; therefore, a model was developed allowing for: (1) residence time distribution resulting from metal particles emanating from different axial locations along the bore; (2) particle agglomeration and distribution of particle sizes within the agglomerated and unagglomerated fractions; (3) two-dimensional gas trajectories with compressible flow effects included; (4) particle lags; (5) augmentation of particle burning rate due to slip effects; and (6) oxidizer depletion. The overall efficiency code defines the size distribution of virgin/agglomerated metal leaving the propellant surface; calculates the weight fraction of metal size which burns within the motor; and obtains the overall fraction of metal burned. A trajectory analysis was developed to calculate the fraction of metal of a given size burned as a function of five independent parameter groupings which were shown to uniquely define this fraction. A.R.H.

N82-30225 Acurex Corp., Mountain View, Calif.
PARTICLE IMPACT EROSION (PIE) ENTRANCE-THROAT RECESSION PREDICTION METHODOLOGY **c20**
M. Abbett and Z. Chiba *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 135-158 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

Data obtained from a variety of experiments were used to develop models of particle impact erosion phenomena. The following experiments were performed: (1) cold-flow tests to characterize particle breakup in rocket nozzles; (2) high-pressure, high-temperature tests to evaluate chemical reactions between aluminum and aluminum oxide particles and carbon surfaces; and (3) subsonic erosion tests to determine erosion due to molten aluminum and aluminum oxide particles impacting heated bulk graphite surfaces. The particle breakup process was correlated in terms of bond number and nondimensional time. Subsonic erosion was modeled in the form of G-laws with two components: mechanical erosion due to mechanical mass removal and chemical erosion due to particle-surface chemical reactions. The chamber flowfield code, and the charring material ablation-erosion code were developed to predict particle impact conditions in the subsonic and transonic regions of rocket nozzles and to predict total recession due to erosion and ablation, respectively. A.R.H.

N82-30226 Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
INTERNAL FLOWFIELD INVESTIGATION: AN OVERVIEW **c34**
R. L. Acree *In* APL The 15th JANNAF Performance Standardizaton Subcomm. Meeting Minutes Mar. 1982 p 159-167 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

A program to examine the internal flow field of solid propellant rocket motors is reviewed. The problems of combustion instability, motor performance and material erosion are addressed. Technical issues include: characterization of vortex shedding phenomena, accounting for grain asymmetry and multidimensional ballistics, and better particle tracking as required for particle erosion calculations. E.A.K.

N82-30227 Purdue Univ., Lafayette, Ind.
ANALYSIS OF UNSTEADY AND STEADY THREE-DIMENSIONAL FLOWFIELDS IN SOLID PROPELLANT ROCKET MOTORS **c20**
J. D. Hoffman *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 169-203 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

Three dimensional flow problems in solid rocket motors and equations for unsteady three dimensional two phase flow were identified. The following topics are discussed: problems of finite difference approximations in physical space, advantages of coordinate transformations, transformed equations in various forms, desired features of coordinated transformations, Thompson-Thames-Martin method, grid control, time dependent coordinates, and block structured grids. It is concluded that procedures governing equations for unsteady three dimensional flows in solid propellant rocket motors, methods of a grid generation to determine body fitted uniform computational grids, finite difference methods for solving equations on body fitted uniform computation grids, are well developed, available, and directly applicable to unsteady three dimensional flow problems in solid propellant rocket motors. E.A.K.

N82-30228 Thiokol Corp., Brigham City, Utah.
USE OF SOLA TO PREDICT UNSTEADY INCOMPRESSIBLE VISCOUS FLOW IN BURNING GRAIN SLOTS **c34**
Mark Salita *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 205-229 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

The SOLA computer program was developed to predict the flow of unsteady viscous phenomena assocated with vortex shedding is described. The computer program treats unsteady incompressible viscous flow with arbitrary rectangular boundaries in two dimensional planar or axisymmetric coordinates. SOLA is a streamlined version of the classical marker and cell (MAC) techniques. SOLA was modified to solve viscous flow over and within rectangular slots with inhibitor stubs and grain burning. The Code is validated for cavity flows by comparison to other numerical schemes and experimental data. Parametric studies demonstrate the viability of the code for application to rocket motor problems. E.A.K.

N82-30229 Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
JANNAF PERFORMANCE STANDARDIZATION SUBCOMMITTEE Annual Report, 1981 **c20**
Daweel George *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 231-246 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

The development of a methodology suitable for adoption as national standards for experimental measurement, analytical prediction, correlation, extrapolation and flight confirmation of the performance of solid propellant rocket motors was studied. The following objectives are accomplished: solid performance methodology, nozzleless performance program, combustion efficiency of highly aluminized solid propellants, acceleration effects on space motors, burn rate determination methodology, and studies conducted with one dimensional three phase flow program. E.A.K.

N82-30230 Hercules, Inc., McGregor, Tex.
WORKSHOP REPORT: BURN RATE DETERMINATION METHODOLOGY **c25**
W. T. Brooks *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 247-253 (For primary document see N82-30216 20-99)
Avail. Issuing Activity CSCL 21/2

Methods for burn rate determination were reviewed. Test motors and usage, correlations and acceptability of proposed method were identified. Methods for determining burn rate were based on web value and measured duration obtained by one of the following techniques: (1) point of web burnout coincident with start of tailoff of the pressure time curve; (2) time when maximum dP/dt occurs; (3) curve inflection point; (4) fixed pressure threshold such as 50 or 10% of miximum pressure; (5) acoustic emission technique in the case of strands. It is concluded that a round robin of burn rate data reduction from firing records of several motors should be conducted, and the feasibility of round robin of subscale motor testing of common propellant should be determined. E.A.K.

N82-30231 Hercules, Inc., McGregor, Tex.
JANNAF WORKSHOP ON BURN RATE DETERMINATION METHODOLOGY **c25**
W. T. Brooks *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 255-267 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

Methodologies on burn rate determination were discussed. The following topics were reviewed: (1) understand existing methods, advantages and disadvantages; (2) identify test motors, usage, test methods, and extent of application to a JANNAF standard; (3) categorize and evaluate burn rate methods considering a proposed standard method; (4) establish burn rate correlation tolerances that are present state-of-the-art, application to proposed standard method; (5) assess acceptability of preliminary proposed method; and (6) identify specific areas for future study. E.A.K.

N82-30232 Hercules, Inc., McGregor, Tex.
WORKSHOP REPORT: BURN RATE DETERMINATION METHODOLOGY (PAPER) **c25**
W. T. Brooks *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 269-278 ref (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/2

Methods used in the industry to establish a recommended standard burn rate determination method were reviewed. A method was developed and regarded very favorably and acknowledged to be better than or comparable to other methods presently in use. It is concluded that the importance of having an accurate standard burn rate determination method is justified. Proceedings of the resulting workshop are summarized. E.A.K.

N82-30233 Hercules, Inc., McGregor, Tex.
RELATIONSHIPS AMONG SOLID PROPELLANT TEMPERATURE SENSITIVITY PARAMETERS **c28**
W. T. Brooks and R. R. Miller (Hercules, Inc., Cumberland, Md.) *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 287-295 ref (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/9

Consistent relationships among temperature sensitivity coefficients were presented. The two propellant temperature sensitivity parameters and symbols most frequently uses are: (1) delta sub p, temperature sensitivity of burn rate at constant pressure; and (2) pi sub K, temperature sensitivity of pressure at constant K sub n. The error involved in present typical practice of application of pi sub K equals delta p/(l-n). Revisions to symbols to restore consistency are recommended. It is concluded that continuous and preferred application of pi sub K = delta sub p/(1-n) warrants revision of definitions to avoid misapplication of data. It is recommended that two symbols to solid rocket glossary to reconcile present practice. E.A.K.

N82-30234 Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
PERFORMANCE MEASUREMENTS **c20**
C. W. Beckman *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 297-305 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 21/8

The performance measurement of the status of measured parameters used against desired measured parameters were reviewed. Delivered performance at identical motor conditions are reported. The important parameters for reporting also require parameter identification. This can be accomplished from several approaches: the performance standardization subcommittee can recommend procedures and parameters and publish them; procedures can be specified through test requirements or can be established from prediction programs through users guide. E.A.K.

N82-30235 Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
THERMOCHEMICAL AND HEAT OF FORMATION DATA **c77**
C. Selph *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 307-313 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/13

Propellant data files were consolidated. A number of handwritten lists and published lists were coded. Each input file was translated into working format, and output was generated according to Bruto formula. A master list is assembled that eliminates all species that are peculiar to a single input file. E.A.K.

N82-30236 Thiokol Corp., Brigham City, Utah.
USER EXPERIENCE WITH INTERIM VERSION SPP **c34**
Ralph Abel *In* APL The 15th JANNAF Performance Standardization Subcomm. Meeting Minutes Mar. 1982 p 315-327 (For primary document see N82-30216 20-99)
Avail: Issuing Activity CSCL 20/4

The problems and successes encountered using the interim version SPP were evaluated. The major problems in matching measured data are: (1) particle size model, to match the wide range of full scale motor firing, a slight change had to be made; (2) erosion loss calculation; the loss using the initial area ratio minus the average area ratio from ODE proved more successful; (3) particle impingement loss, the program is unable to handle the impingement loss for high expansion ratio nozzles with high impingement present. It is found that the current interim version with the changes made in particle size and erosion calculation is successful in accurately predicting the 21 motor data base with the exception of the high impingement nozzle. E.A.K.

N82-30237*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE TELECOMMUNICATIONS AND DATA ACQUISITION REPORT
N. A. Renzetti, ed. 15 Jun. 1982 212 p refs Sponsored by NASA
(NASA-CR-169195; JPL-TDA-PR-42-69; NAS 1.26:169195)
Avail: NTIS HC A10/MF A01 CSCL 05A

Developments in Earth based radio technology with applications to space communications, geodynamics, and astrophysics are reported. For individual titles, see N82-30238 through N82-30259.

N82-30238*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIO ASTRONOMY **c89**
R. D. Shaffer and S. Gulkis *In its* The Telecommun. and Data Acquisition Rept. 15 Jul. 1982 p 1-2 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 03A

Use of the Tidbinbilla Interferometer to refine the source positions in the Parkes 2.7 GHz survey of the southern sky is described. A result of the first phase of this work was the identification of a quasi-stellar object which appears to be the most remote object yet observed. This object has a red shift of 3.78 (PKS 2000-330, and a velocity of recession equal to 91% of that light. Based on Hubble's law, PKS 2000-330 appears to be 12 billion light years away. J.D.

N82-30239*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ORION DOWNCONVERTER AND POWER SUPPLY c33
H. G. Nishimura *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 3-9 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09C

The receiver subsystem supplies the front end assembly (downconverter) and power supply for the ORION Mobile Station. These assemblies are designed to withstand severe environmental conditions. The mechanical, electronic, environmental and maintenance design considerations encountered during the design phase of this project are discussed. The two channel S/X downconverter has a 400 MHz bandwidth channel. Phase stability of 2 and 7 deg at S- and X-bands, respectively, is achieved with a temperature stabilized first local oscillator. Author

N82-30240*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NETWORKS CONSOLIDATION PROGRAM c14
M. L. Yeater, D. T. Herman, and E. B. Luers (Bendix Field Engineering Corp.) *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 10-13 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 14B

Progress in the networks consolidations program (NCP) to combine the resources of the two NASA ground spacecraft tracking networks (the Deep Space Network, operated by JPL, and the ground spaceflight tracking and data network, operated by Goddard) into one consolidated network is reported. Management, design, and implementation activities occurring between August 1981 and April 1982 are addressed, with special emphasis on planning and budgeting activities. J.D.

N82-30241*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MANAGEMENT AND DEVELOPMENT OF LOCAL AREA NETWORK UPGRADE PROTOTYPE c81
T. J. Fouser *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1981 p 14-19 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 05A

Given the situation of having management and development users accessing a central computing facility and given the fact that these same users have the need for local computation and storage, the utilization of a commercially available networking system such as CP/NET from Digital Research provides the building blocks for communicating intelligent microsystems to file and print services. The major problems to be overcome in the implementation of such a network are the dearth of intelligent communication front-ends for the microcomputers and the lack of a rich set of management and software development tools. Author

N82-30242*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ALGORITHMS FOR SOFTWARE DEVELOPMENT VERSION CONTROL AND CHANGE DETECTION c61
R. C. Tausworthe *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 20-35 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09B

Simple computer algorithms for processing source program and text data files in order to extract change detection, version control, version history, and current status information are described. These algorithms presuppose that it is possible to attach to each record of the source files a 6-character code, placed within delimiters that will cause the compiler, or other using program, to ignore this code field. The code contains a 2-character code for a character-by-character position-sensitive checksum of the record, another for the record number in the file, and a third for the data on which the encoding took place. Once the source file has been thus encoded, it is possible to detect the following transactions on the file since the most recent version coding: (1) addition of new records (having no version code), (2) modification of existing records, (3) deletion of a number of records, (4) movement and/or duplication of existing records, and (5) modification and duplication of records. In addition, it is possible to extract a version history of the number of records created or modified by date. A special file listing program is described which prints the file records without showing the version codes, but places a 'change bar' at the right margin whenever a change is detected. The program also provides a list of changed pages and a version history. Author

N82-30243*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PERFORMANCE DEGRADATION OF THE BLOCK IV TELEMETRY SYSTEM DUE TO THE PRESENCE OF A CW INTERFERENCE c17
M. K. Sue *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 36-48 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 09F

The presence of an in-band continuous wave interference can seriously degrade the performance of a telemetry system. Degradation effects for a phase shift keying (PSK) system can be found in Refs. 1 and 2. The telemetry system employed for deep space communications is a binary phase-shift keying system (BPSK) with squarewave subcarriers. The use of squarewave subcarriers makes the system less sensitive to in-band interference than a system using sinusoidal subcarriers. A model that allows one to predict the telemetry degradation for the deep space telemetry system is presented and backed with experimental data. Author

N82-30244*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SELECTION OF FREQUENCIES FOR DEEP-SPACE TELECOMMUNICATIONS c32
N. F. deGroot and M. K. Sue *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 49-61 refs Presented at the Meeting of the Space Frequency Coordination Group, Oberpfaffenhofen, West Germany, Oct. 1981 (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 17B

The procedures used by the Jet Propulsion Laboratory to select and recommend frequencies to be used for deep space telecommunications are explained. The frequency selection process described deals only with the potential for radio frequency interference between deep space telecommunication links. Channel plans based on bandwidth, hardware implementation, and frequency ratio considered are used. The channel selection process is based on calculations and analysis of interference-to-signal power ratios as a function of time for each possible pair of missions. The modes of interference and the interference protection ratio are explained, and the interference analysis procedure described. Equations used in calculating the downlink and uplink interference analyses are presented. J.D.

N82-30245*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NEW CCIR PAPERS ON TELECOMMUNICATIONS FOR DEEP SPACE RESEARCH c32
N. F. deGroot *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 62-80 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 17B

Three draft reports submitted by JPL to the International Radio Consultative Committee (CCIR) for inclusion in their 1982 edition of reports and recommendations are presented. Potential interference between deep space telecommunications and the fixed satellite and broadcasting satellite services in harmonically related bands, protection criteria and sharing considerations relating to deep space research, and preferred frequencies and bandwidths for deep space research are considered. J.D.

N82-30246*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANALYSIS, PREDICTION AND CONTROL OF RADIO FREQUENCY INTERFERENCE WITH RESPECT TO DSN c32
N. F. deGroot *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 81-100 refs (For primary document see N82-30237 20-99)
Avail: NTIS HC A10/MF A01 CSCL 20N

Susceptibility modeling, prediction of radio frequency interference from satellites, operational radio frequency interference control, and international regulations are considered. The existing satellite interference prediction program DSIP2 is emphasized. A summary status evaluation and recommendations for future work are given. J.D.

N82-30247*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

FIELD INTERFACE MODULE SOFTWARE DESCRIPTION **c61**

H. Valtier *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 101-106 ref (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 09B

The software for the field interface module (FIM) is designed to fully optimize the hardware capabilities of the FIM. Software routines exist which enable the FIM to monitor data, control components, communicate with an uplink computer, and perform real-time and local self-diagnostics. The FIM program is not dependent upon any particular uplink computer and is adaptable to various applications with a miniumum of modifications. Author

N82-30248*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

FIELD INTERFACE MODULE FOR ANTENNA CONTROL ASSEMBLY **c32**

F. Baher *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 107-112 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 09C

The hardware aspects and capabilities of the field interface module (FIM) developed for monitor and control functions in the antenna mechanical subsystems of the deep space network and in the technical facilities controllers for the various complexes are described. The FIM is capable of monitoring and responding to a range of anaog and digital inputs and controlling external elements. The flexibility of the design makes it applicable to other control needs, using software developed for those specific applications. Author

N82-30249*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

THE DEVELOPMENT VERSION CONTROL AND VISIBILITY SUBSYSTEM **c01**

L. R. Hawley *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 113-116 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 05A

A prototype development version control and programming environment visibility subsystem (DVCS) is described. DVCS provides an implementation/management interface serving both the implementor and management. The DVCS provides the implementor listings annotated with change bars, detects errors in the block structure of the design and indicates when standards requiring the use of structured programming constructs in the design of software are violated. E.A.K.

N82-30250*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

RECEIVER-EXCITER CONTROLLER DESIGN **c32**

P. A. Jansma *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 117-125 (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 09C

A description of the general design of both the block 3 and block 4 receiver-exciter controllers for the Deep Space Network (DSN) Mark IV-A System is presented along with the design approach. The controllers are designed to enable the receiver-exciter subsystem (RCV) to be configured, calibrated, initialized and operated from a central location via high level instructions. The RECs are designed to be operated under the control of the DMC subsystem. The instructions are in the form of standard subsystem blocks (SSBs) received via the local area network (LAN). The centralized control provided by RECs and other DSCC controllers in Mark IV-A is intended to reduce DSN operations costs from the Mark III era. E.A.K.

N82-30251*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ANALYSIS OF CAPACITIVE HEAT EXCHANGERS, PART 2 **c44**

D. Schonfeld *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 126-144 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 10A

The performance of a simple capacitive heat exchanger was analyzed. The shooting method for solving the governing equations is presented. Simplified linear and nonlinear models are analyzed using this method and it is shown that capacitive heat exchangers are more efficient than conventional ones. E.A.K.

N82-30252*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

REVIEW OF CORROSION CAUSES AND CORROSION CONTROL IN A TECHNICAL FACILITY **c26**

T. Charng and F. Lansing *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 145-156 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 11F

Causes of corrosion of metals and their alloys are reviewed. The corrosion mechanism is explained by electrochemical reaction theory. The causes and methods of controlling of both physiochemical corrosion and biological corrosion are presented. Factors which influence the rate of corrosion are also discussed. E.A.K.

N82-30253*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

A NEW HIGH-POWER KLYSTRON FOR THE DSN **c33**

A. Goldfinger (Varian Associates, Inc.), M. A. Gregg, and R. Hartop *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 157-173 (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 09A

A very high reliability 100 kW klystron for the Deep Space Network (DSN) high power transmitters in support of spacecrafts to the distant planets was studied. The last phases included electron gun fabrication and beam analyzer evaluation and klystron prototype fabrication, mechanical and electrical design improvements resulted in the delivery of a prototype klystron meeting all requirements. It is concluded that the development of a new high power klystron for the DSN was very successful as demonstrated by the prototype results. E.A.K.

N82-30254*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

LATERAL AND DRAG FORCES ON MISALIGNED CYLINDRICAL ROLLERS **c39**

H. McGinness *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 174-178 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 20K

Formulas are presented for estimating the drag and lateral forces on misaligned cylindrical rollers. A formula for the lateral force coefficient of a misaligned cylindrical roller on a flat track was made up. Reasonable values for the sliding coefficient of friction micro and for the rolling drag coefficient f when inserted into the formula produce values which are in in agreement with the lateral force test results. The drag force coefficient was calculated for a misalignment value of 13.7 arc minutes and compared with the measured values obtained on a model of an antenna wheel and track system. The estimation of drag torque of an antenna employing a wheel and track bearing system, and the estimation of the lateral forces induced on the wheel by a slight misalignment are equated. E.A.K.

N82-30255*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

APPLICATION OF RADIATIVE TRANSFER THEORY TO MICROWAVE TRANSMISSION MEDIUM CALIBRATIONS **c32**

C. T. Stelzried *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 179-188 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 20N

Precise determinations of the transmission medium loss and

noise temperature contribution which are important to the performance characterization of low noise microwave receiving systems and thermal noise standards are discussed. Tropospheric loss is frequently inferred from microwave radiometer noise temperature measurements. Interpretation of these measurements requires an inversion of the radiative transfer integral equation. This is inconvenient even with computer techniques. Solutions of a rapidly convergent power series of the radiative transfer equations are presented. This solution is applicable to a low loss medium with either uniform or nonuniform loss distributions. A four layer atmosphere model is investigated to demonstrate the accuracy of the solution relative to the model. Applications include thermal noise standards and single- and dual-frequency water radiometers. E.A.K.

N82-30256*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

PROVISION OF 9.6-kbps WIDEBAND DATA RATE CAPABILITY IN THE DSN c32

G. J. Brunder *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 189-193 (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 20N

The new 9.6-kbps wideband data rate capability in the DSN is reviewed. A functional description of the completed implementation is presented, together with a plan to upgrade the central communications terminal for additional 9.6 s operational flexibility. E.A.K.

N82-30257*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

FIELD REPAIR OF MICROPROCESSOR-BASED EQUIPMENT c60

A. Burford *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 194-196 (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 09B

The methods in the Deep Space Network to support the maintenance of microprocessor based devices are described. Tests are performed by in circuit emulation and the ability to generate executable microdiagnostics in the field. More comprehensive diagnostics which may be down loaded from a remote location are generated. The need for a change in past training philosophy when dealing with microprocessor is pointed out. E.A.K.

N82-30258*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

GOLDSTONE RADIO SPECTRUM SIGNAL IDENTIFICATION, MARCH 1980 - MARCH 1982 c32

B. A. Gaudian *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 197-199 (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 17B

The signal identification process is described. The Goldstone radio spectrum environment contains signals that are a potential source of electromagnetic interference to the Goldstone tracking receivers. The identification of these signals is accomplished by the use of signal parameters and environment parameters. Statistical data on the Goldstone radio spectrum environment from 2285 to 2305 MHz are provided. E.A.K.

N82-30259*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ENERGY CONSUMPTION ANALYSIS FOR THE MARS DEEP SPACE STATION c44

N. V. Hayes *In its* The Telecommun. and Data Acquisition Rept. 15 Jun. 1982 p 200-207 refs (For primary document see N82-30237 20-99)

Avail: NTIS HC A10/MF A01 CSCL 10B

Results for the energy consumption analysis at the Mars deep space station are presented. It is shown that the major energy consumers are the 64-Meter antenna building and the operations support building. Verification of the antenna's energy consumption is highly dependent on an accurate knowlege of the tracking operations. The importance of a regular maintenance schedule for the watt hour meters installed at the station is indicated. E.A.K.

N82-30260# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

LA RECHERCHE AEROSPATIALE, BI-MONTHLY BULLETIN, NO. 1982-1, JANUARY-FEBRUARY 1982

Claude Sevestre, ed. ESA May 1982 64 p refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 Sponsored by ESA

(ESA-TT-755) Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

Wind tunnel studies of aircraft store separation and of a fluid jet crossing a cavity are described. Natural vibration of immersed shells and continuity of a viscous fluid flowing around a body are discussed. Parallel processing and methods for constructing orthogonal or nonorthogonal meshes are presented. A satellite gravity gradiometry project is outlined. Free-edge effects in composite materials are dealt with. For individual titles, see N82-30261 through N82-30268.

N82-30261# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

WIND TUNNEL STUDIES OF STORE SEPARATION WITH LOAD FACTOR. FREEDROPS AND CAPTIVE TRAJECTORIES c02

J. Coste and J. Leynaert *In its* La Rech. Aerospatiale, Bi-monthly Bull. no. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 1-9 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)

Avail: NTIS HC A02/MF A01; original report in FRENCH available at ONERA, Paris FF 55

Techniques used to study separation trajectories of stores dropped from under an aircraft are described. In dropping tests, light, heavy and intermediate scaling laws which respect the Mach number are studied. The captive trajectory tests use a six degrees of freedom system which moves the model step by step in the aerodynamic field of the aircraft. Aerodynamic forces acting on the store are measured by an internal balance. This method does not take into account the relative speed of store and aircraft. Arrangements used to compensate for this defect are shown. When the stores are inert, have perturbed trajectories, high initial separation speeds, or are incompatible with an external mount and an internal balance, the freedrop method is preferable, particularly for short trajectories. In the contrary cases, or when the store is propelled, the captive trajectory method is essential. For long trajectories, with several phases, the two methods are used in conjunction. Author (ESA)

N82-30262# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

MODEL BASED STUDY OF VARIOUS CONFIGURATIONS OF JET CROSSING A CAVITY. APPLICATION TO THE CEPRA 19 WIND TUNNEL OF PROPULSION TEST CENTER (CEPr) c34

P. Rebuffet and A. Guedel *In its* La Rech. Aerospatiale, Bi-monthly Bull. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 11-22 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)

Avail: NTIS HC A02/MF A01; original report in FRENCH available at ONERA, Paris FF 55

A scale model study of a jet crossing the cavity made by the chamber of an anechoic wind tunnel was undertaken. The length of the free jet and the dimensions of the diffuser inlet were varied. Cavity resonances due to aeroacoustic coupling which can prevent measurements from being made, were investigated. Background noise was measured. The aerodynamic characteristics of the jet and the reverse flow within the cavity were studied. A collector compatible with test sections of 2 and 3 m diameter was defined for the CEPRA 19 wind tunnel. For a given collector, critical velocity increases with jet length. Long test sections with large collectors canalize reverse flow near the walls. Velocity distribution in the potential cone remains good, with stability in time. Loss of relative pressure due to the free test section increases linearly with the length of the latter. Author (ESA)

N82-30263# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

NATURAL MODES OF AN IMMERSED STRUCTURE c39

J. Boujot and J. J. Angelini *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 23-29 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

A mathematical model for studying the coupling of a flexible shell with an exterior compressible fluid is proposed. It is shown that for an infinite medium without gravity, if the ratio of frequency to sound velocity is small, a coherent definition of vibration Eigen mode shapes can be obtained. These equivalent mode shapes follow an approximation of the initial vibration problem. Helmholtz's equation in an exterior domain is used to define pressure due to the fluid. A fluid structure direct coupling method is used to demonstrate that the problem is equivalent to solving a coupled system of integral equations and partial differential equations. The approximation hypothesis of the initial problem is used to obtain a model self-adjoint spectral problem, on the basis of which vibration modes can be defined. Discretization methods can be exploited. Author (ESA)

N82-30264# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
POTENTIALITY ASSESSMENT OF A PARALLEL STRUCTURE FOR THE SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS **c64**
J. P. Boisseau, M. Enselme, D. Guiraud, and P. Leca *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 31-41 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982-1 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

The parallel computing efficiency of a minicomputer system consisting of an AP 120 B array processor linked to a 32 bits, SEL 32/77 host computer was assessed. In order to determine performance, a pseudo-unsteady method applied to transonic two or three dimensional flow computation and a pseudo-spectral space time method for numerical simulation of turbulence were programmed. Processing time, using the array processor, and the transfer time between the memory and the computer unit were differentiated in the analysis of results. Results indicate that computation speeds similar to those of CDC 7600 are possible. Long duration operations are feasible. Author (ESA)

N82-30265# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
SKIN FRICTION LINES **c02**
R. Legendre *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 43-44 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

The conditions of quick variation of the properties of a viscous fluid, flowing around a body, are discussed. The hypothesis of continuity, either taken alone, or combined with Lighthill's hypothesis is examined. The interactions of skin friction lines, originating from a stagnation point (N) upstream of an obstacle, are considered. A quasi-discontinuity is shown on the line of separation which bisects the line N-A, where A is a singular downstream point of nonstated nature. Only pressure is continuous; temperature entropy and stagnation enthalpy are facets of the quasi-discontinuity. Author (ESA)

N82-30266# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
A NEW METHOD FOR CONSTRUCTING TWO DIMENSIONAL ORTHOGONAL AND NONORTHOGONAL MESHES
H. Viviand *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-255) May 1982 p 45-49 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

A mesh construction method which involves only the integration of an ordinary differential equation, and gives the Cartesian coordinates of mesh points directly, is described. A nozzle and an airfoil profile example are treated. The mesh consists of two families of lines of equations, X (x, y) = Cst, and Y (x, y) = Cst, where (x, y) are Cartesian coordinates of the physical plane. The family Y = Cst is defined by choosing curvilinear coordinates (xi, eta) so that the transformation x = x (xi, eta), y = y (xi, eta) is simple computationally. On any Y = Cst line, eta must be a single valued function of xi. Lines Y = Cst can then be given by eta = p (xi, Y), where p (x, Y) is such that the derivative of p relative to Y keeps a constant sign and does not vanish for O < or = Y < or = 1. Further, p (xi, O) is fixed, since the curve of equation y = o is given; p (xi, o) is fixed if Y = 1 is given Author (ESA)

N82-30267# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
ONERA SATELLITE GRAVITY GRADIOMETRY PROJECT **c90**
A. Bernard *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 51-57 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

The use of spaceborne accelerometers for gravity gradiometry is described. The tensor of the second derivatives of the gravitational potential is measured by arranging the accelerometers so that they form a simple geometric figure centered at point O (which is not necessarily identical to the center of mass of the satellite). With four instruments, when residual velocities are zero, and the accelerometers form a perfectly regular square, accuracy is limited only by measurement quality. Since only differential measurements are used, systematic errors in sensitivity directly affect gradient measurements. Scale factor matching of the accelerometers is required, given a 0.1 Eotvos resolution specification for 300 km altitude. Author (ESA)

N82-30268# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
FREE-EDGE EFFECTS IN COMPOSITE SYMMETRIC LAMINATED PLATES **c24**
D. Engrand *In its* La Rech. Aerospatiale Bi-monthly Bull. No. 1982-1, Jan.-Feb. 1982 (ESA-TT-755) May 1982 p 59-63 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1982-1, Jan.-Feb. 1982 (For primary document see N82-30260 20-99)
Avail: NTIS HC A04/MF A01; original report in FRENCH available at ONERA, Paris FF 55

Free-edge effects in a laminated plate (no bending-stretching coupling) of arbitrary width, loaded in its plane, were studied. A boundary layer method, associated with a semianalytic approximation method was used. The method gives approximate stresses which satisfy all equilibrium equations, boundary conditions, and continuity conditions, without singularities. Numerical results for graphite-epoxy composites are presented. A model which uses the characteristics of a plate, capable of withstanding a force F, to describe a second plate, capable of withstanding p F (p = positive integer) is outlined. Author (ESA)

N82-30269# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE, NO. 16
26 Jul. 1982 108 p refs Transl. into ENGLISH from various Russian publications
(JPRS-81359) Copyright. Avail: Issuing activity

The chronology of Salyut 7 is presented. Venera 13 and 14 mission highlights are presented, including landing on Venus, atmospheric and surface composition data, volcanic and electrical phenomena, and lander design development. Exobiology and space medicine are considered. Soviet communications satellites and space cameras are discussed. Recent Soviet launches are listed. For individual titles, see N82-30270 through N82-30281.

N82-30270# Joint Publications Research Service, Arlington, Va.
CHRONOLOGY OF 'SALYUT-7' FLIGHT c12
In its USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 2-6 Transl. into ENGLISH from The Soviet News Agency TASS (For primary document see N82-30269 20-99)
Avail: Issuing Activity

A chronology of scientific and technical research performed on the Salyut space station is presented. Docking procedures are reviewed. Life support, energy supply, thermal regulation, and navigation systems are summarized. Procedures for placing the Iskra 2 satellite into orbit are reported. Preparation of instruments is reviewed. Adaptation to weightlessness is summarized. Remote sensing and plant experiments are reported. N.W.

N82-30271# Joint Publications Research Service, Arlington, Va.
VENERA DATA ON ATMOSPHERE AND SURFACE COMPOSITION c91
Yu. Surkov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 7-11 Transl. into ENGLISH from Pravada (USSR), 3 Mar. 1982 p 3 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

Knowledge of the Venutian atmosphere and surface as recorded by Venera probes is reviewed in order to provide background for the Venera 13 and 14 missions. Equipment onboard these two spacecraft is described, including gas chromatographs and a mass spectrometer intended to determine the chemical and isotope composition of the atmospheric gases, an X-ray spectrometer to determine the components of aerosol particles within the cloud layer, a spectrometer to analyze the diffusion of sunlight by the atmosphere and clouds, and other instruments. N.W.

N82-30272# Joint Publications Research Service, Arlington, Va.
VENERA FINDINGS ON VOLCANIC AND ELECTRICAL PHENOMENA c91
L. Ksanfomaliti *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 12-15 Transl. into ENGLISH from Pravda (USSR), 8 Mar. 1982 p 7 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

Knowledge of the Venutian atmosphere and surface is reviewed. Atmospheric electricity and its apparent relationship with volcanic activity are discussed. Data from Pioneer and Venera spacecraft are reviewed. N.W.

N82-30273# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF DESIGN FOR 'VENERA' LANDERS c15
V. Zubkov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 16-17 Transl. into ENGLISH from Sots. Industr. (USSR), 12 Mar. 1982 p 4 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

Stabilizing the Venera lander descent vehicle by means of a 'notched crown' or skirt is described. Helicopter drop and wind tunnel tests are reviewed. The aerodynamics of the landers, affected by soil sampling and other devices, are summarized. Descent, oscillation, and rotation parameters are reviewed in terms of strong wind and atmospheric turbulence. N.W.

N82-30274# Joint Publications Research Service, Arlington, Va.
PRESS CONFERENCE ON ACCOMPLISHMENTS OF 'VENERA-13' AND 'VENERA-14' c12
In its USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 18-21 Transl. into ENGLISH from Izv. (USSR), 14 Mar. 1982 p 2 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

Knowledge of the Venutian atmosphere and surface from Venera spacecraft was reviewed. The descent vehicle was discussed. Soil sampling and transmission of clear landscape panoramas were summarized. Atmospheric composition was discussed. The cloud cover was described. Color images of the Venutian surface were discussed. N.W.

N82-30275# Joint Publications Research Service, Arlington, Va.
MEDICAL-BIOLOGICAL INVESTIGATIONS UNDER SPACE CONDITIONS: PRESENT AND FUTURE SIGNIFICANCE c52
H. Fritze *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 22-24 Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2, Apr. 1981 p 51-52 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

Weightlessness and cosmic radiation are discussed in terms of their medical and biological effect. Psychological factors are also considered. N.W.

N82-30276# Joint Publications Research Service, Arlington, Va.
TWENTY YEARS OF MANNED SPACE FLIGHT FROM THE VIEWPOINT OF SPACE MEDICINE c52
H. Haase *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 25-43 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2, Apr. 1981 p 52-60 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

Preparation for the first manned space flight is reviewed. The flight itself is summarized from the point of view of space medicine. Women in space and extravehicular activity are also discussed. N.W.

N82-30277# Joint Publications Research Service, Arlington, Va.
INITIAL AUDIOMETRIC INVESTIGATIONS IN AN ORBITAL STATION c52
W. Proehl, R. Mocker, Ya. Yakovleva, I. I. Bryanov, and M. V. Nefedova *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jun. 1982 p 44-49 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2 Apr. 1981 p 60-62 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

Audiometric investigations were conducted for the first time in an orbital station. The filter audiometer and the precision sound impulse level measuring instrument, used during audiometric measurements in the station, are described and the audiograms of three measurements by both cosmonauts are described. No major deviations from the norm were found. Author

N82-30278# Joint Publications Research Service, Arlington, Va.
INTRACUTANEOUS PARTIAL OXYGEN PRESSURE (pO2 SUB ic) IN MAN DURING SHORT-TERM SPACE FLIGHTS: RESULTS OF JOINT USSR-GDR SPACE FLIGHT c52
H. Haase, E. A. Kovalenko, A. Vacek, M. P. Bobrovnitskiy, B. Jarsumbeck, and V. N. Sementsov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 50-57 refs Transl. into ENGLISH from Z. Militaermed. (East Germany), no. 2, Apr. 1981 p 63-65 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

The results of the Kislorod/Oxygen experiment are presented. The partial intracutaneous oxygen pressure (PIOP) was determined polarographically. The measurement probe used was an uncovered platinum puncture electrode. In the spaceship engineer, the PIOP during space flight had dropped by 19 mm Hg and local oxygen utilization had gone down by 4 mm Hg. During the hyperventilation test, during the first few days after the space flight, the spaceship commander only had a minor increase while the engineer and no increase in the PIOP. The results are preliminary. They agree well with the measurements on other spaceship crews. Author

N82-30279# Joint Publications Research Service, Arlington, Va.
SOVIET COMMUNICATIONS SATELLITES c15
Pavel Artemyevich Agadzhanov, Amos Aleksandrovich Bolshoy, and Viktor Ivanovich Galkin *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 58-88 Transl. into ENGLISH from Nov. Zhizni, Nauke, Tekh.: Ser. Kosmonavt., Astron. (USSR), no. 12, Dec. 1981 p 3-6, 18-56 (For primary document see

N82-30269 20-99)
Avail: Issuing Activity

Features of Soviet satellite radio links are discussed. Systems employing Molniya satellites are discussed. The utilization of stationary satellites is considered. The first Soviet communication satellite system is described. The Orbita television network is explained. The Moskva and Ekran systems are reviewed. Mobile systems are discussed. N.W.

N82-30280# Joint Publications Research Service, Arlington, Va.

KATE-140 AND MKF-6M SPACE CAMERAS **c35**

V. Kuchumov *In its* USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 89-92 Transl. into ENGLISH from Aviats. Kosmonavt. (USSR), no. 1, Jan. 1982 p 40-41 (For primary document see N82-30269 20-99)
Avail: Issuing Activity

The KATE-140 large-format topographic camera made it possible to obtain photographs suitable for precision photographic-survey processing. It has a field of vision of 85 deg which makes it possible for a single frame to contain an image of a 450x450-km segment of the Earth's surface from orbital altitude. Precise measurement of the linear dimensions of objects and their mutual positions can be carried out on the photographs. Moreover, the camera's high resolution meets imagery-interpretation requirements. A guidance device provides for both single and strip photographs with a given interval. A punching machine is used to separate the strips. Before being used on the Salyut-6 station, the other fixed camera, the MKF-6M, underwent thorough testing onboard the Soyuz-22 spacecraft. The multispectral MKF-6M camera is designed to obtain information about the spectral characteristics of natural objects in order to increase the reliability of their interpretation. It has six spectral channels, four of which encompass the visible spectra and two of which are in the near-infrared. Author

N82-30281# Joint Publications Research Service, Arlington, Va.

LIST OF RECENT SOVIET SPACE LAUNCHES **c12**

In its USSR Rept.: Space, No. 16 (JPRS-81359) 26 Jul. 1982 p 103-105 Transl. into ENGLISH from TASS, n.d., n.p. (For primary document see N82-30269 20-99)
Avail: Issuing Activity

A table showing launch dates and orbital parameters for 33 communication, meteorological, and Earth resources satellites is presented. N.W.

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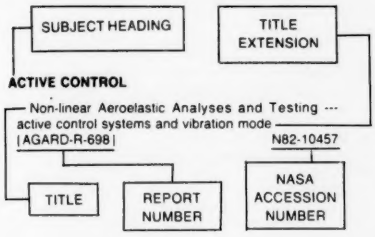

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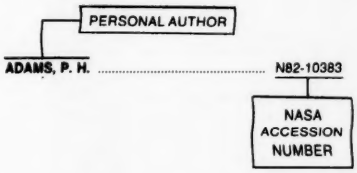

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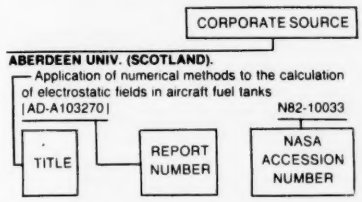

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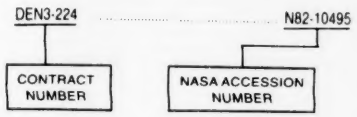

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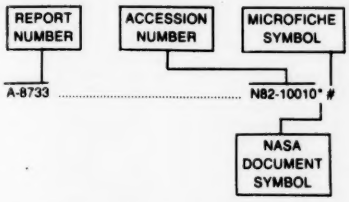

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